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ABSTRACT

The study investigates the determinants of the earnings distribution in the U.S. paying particular attention to the less-skilled segment of the workforce. A general earnings theory is proposed which has elements of human capital theory, institutional hypotheses, and radical stratification analysis. Much attention is paid to testing the "crowding" hypothesis that workers restricted to employment in a limited number of industries or occupations will be paid substantially less than workers who are not so restricted. The regression results, based on a large integrated micro-macro data set, yield extensive evidence of stratification and industry variables affecting earnings after controlling for differences in human capital. This is especially true among less-skilled workers. The research includes both a literature review and extensive bibliography. (Author)

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THE PERSONAL EARNINGS DISTRIBUTION: INDIVIDUAL AND INSTITUTIONAL DETERMINANTS

Barry A. Bluestone

Institute of Labor and Industrial Relations
University of Michigan-Wayne State University
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by

Barry Alan Bluestone

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in
The University of Michigan
1974

Doctoral Committee:

Professor Harold Levinson, Chairman
Professor Daniel Fusfeld
Assistant Professor Malcolm Cohen
Professor Gerald Gurin

ABSTRACT

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by

Barry Alan Bluestone

Chairman: Professor Harold Levinson

This study investigates the determinants of the earnings distribution in the United States paying particular attention to the less-skilled segment of the workforce.

A general earnings theory is proposed which has elements of human capital theory, institutional hypotheses, and radical stratification analysis. Much attention is paid to testing the "crowding" hypothesis that workers restricted to employment in a limited number of industries or occupations will be paid substantially less than workers who are not so restricted. It was hypothesized that after controlling for differences in human capital, large wage differentials would continue to exist for similarly qualified workers. These differences could be attributed to the stratification of the labor force, particularly by race and sex. Once stratified, differences in industry characteristics would have an effect on the personal earnings

distribution as well. Those workers who gain employment in the more concentrated, profitable, and unionized industries will earn more than others who have similar work characteristics.

The regression results, based on a large integrated micro-macro data set, yield extensive evidence of stratification and industry variables affecting earnings after controlling for differences in human capital. This is especially true among the least skilled workers in the labor force although there is a substantial earnings effect throughout most of the occupational hierarchy. While it was impossible to obtain incontrovertible evidence that "crowding" was the culprit in producing "human capital constant" wage differentials, the evidence seems to point overwhelmingly in this direction. Concentration and unionization also have a significant impact on wages as well as a number of other industry factors.

The overriding policy implication following from this analysis is that large scale government intervention is required in order to correct the apparently massive "inefficiencies" that currently exist in American labor markets. Intervention is required to equalize human capital investment opportunities but equally important to break down the barriers to inter-occupational and inter-industry mobility that apparently still exist.

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PREFACE

The present study began a number of years ago, when in the course of poverty research, the common stereotype of the poor was shattered by the revelation that the majority of the poor work and in nearly a third of all poor households the head works full-time all year round.[1,2] The AFDC mother, the aged, the infirm, the industrially "undisciplined," in short those out of the labor force or unemployed were found to be only a portion of the poor. For many others poverty was discovered to be the result of low-wage employment rather than no employment at all.

Many of the particular causes which explain the poverty of the nonworking poor--sickness, old age, illiteracy, and "bad luck"--fail to adequately explain the poverty incomes of those who work. For them poverty is a much more complex phenomenon going beyond individual

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[1] Some of the earliest research on the working poor include: George Delehanty and Robert Evans, Jr., "Low-Wage Employment: An Inventory and an Assessment" (Northwestern University, n.d.) unpublished manuscript; Laurie D. Cummings, "The Employed Poor: Their Characteristics and Occupations," Monthly Labor Review, July 1965; Dawn Wachtel, The Working Poor (Ann Arbor: Institute of Labor and Industrial Relations, University of Michigan-Wayne State University, 1967) mimeo; Barry Bluestone, "Low-Wage Industries and the Working Poor," Poverty and Human Resources Abstracts, March 1968.

[2] Computed from "Work Experience of Family Heads, by Poverty Status of Family, 1968," U.S. Department of Labor, Manpower Report of the President (Washington: U.S. Government Printing Office), March 1970, Table 1, p. 121.

inadequacies. The confluence of market forces and personal attributes forms a complex web from which the individual factors contributing to low earnings are difficult to unravel. Wage theory should help us understand the problem, but so far it has generally failed.

The reason for this is that the simplifying assumptions in traditional wage theory tend to confuse the issue. The assumption of a homogeneous labor force, found in the institutionalist framework, tends to obscure the earnings effect of differences in skills and competencies among workers. Alternatively assuming perfect competition and labor mobility as in the pure human capital theory obscures many other factors which impose their own order on the distribution of income and earnings. An understanding of the working poor requires a general wage theory that focuses on both the characteristics of workers themselves, and on the labor markets in which they work, while dropping the restrictive assumptions normally found in traditional wage theory. To understand the determinants of low wages requires an understanding of the whole distribution of earnings. What began as a narrow study of poverty employment thus blossomed into a more general investigation of the determinants of personal earnings in the United States.

My original interest in the problem was spurred by Louis Ferman, Director of the Research Division of the Institute of Labor and Industrial Relations, University of Michigan-Wayne State University. My colleagues Mary Stevenson and Charles Betsey helped prepare the data set and contributed to some of the analysis. William Murphy was indispensible in writing computer programs well beyond my capability while Lynn Ware, James Sumrall, Jr., and Martha MacDonald troubled over some of the theory and mathematical presentation with me. Countless friends associated with the Union for Radical Political Economics were helpful at various times in suggesting hypotheses to test and always kept steering my research in relevant directions. Mrs. Kathleen Schwartz was responsible for diligently typing the final draft. Finally a special note of appreciation goes to my dissertation committee, Professors Harold Levinson, Malcolm Cohen, Daniel Fusfeld, and Gerald Gurin. The committee aided me immeasurably in the development of the project and always did their best to force me to consider all sides of the issues involved. To all of these people I extend my warmest appreciation for their help and their friendship.

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CHAPTER I

INTRODUCTION

What factors determine an individual's wage? How are earnings related to "skills" and to "productivity." To what extent does the distribution of personal earnings reflect the distribution of skills and to what extent institutional factors? These are the fundamental questions which are the concern of this dissertation.

There exists today no generally agreed upon wage theory. Rather there exists a set of hypotheses, each constrained by its own set of assumptions, each with its own distinct set of "exogeneous variables," and each in competition with the other. Consequently, there is general confusion over the relationship between "wage," "skill," and "productivity." Adam Smith's theory of "compensatory" wage differentials, J.B. Clark's marginal productivity theory, and the investment theory of earnings stemming from the work of Denison, Schultz, and Becker all posit a tight relationship between an individual's own skills, productivity, and earnings. In opposition, institutionalist wage theory discards the neoclassical assumptions of perfect product and labor markets thereby disrupting a more perfect mapping of human capital into the distribution of earnings. Industrial characteristics replace human capital attributes as the primary variables in institutional wage theory. "Radical" wage theory, based on social stratification analysis, goes beyond the institutionalist critique, severing any link between personal human capital investment decisions and individual earnings. An individual's stock of human capital, according to radical theory, is a function of class, race, and sex. Relative earnings are determined by social status rather than individual choice in the acquisition of human capital.

The competition between neoclassical, institutionalist, and radical theories remains largely unresolved.[1] Each theory has a distinct wage generating function which explains only a portion of the existing variance in earnings. Generally the theories have not been tested against each other. Consequently, a wage theory synthesis has not evolved, much less a new scientific "paradigm," to use the terminology of Thomas Kuhn.[2]

Yet the framework for a synthesis can be constructed. By substituting the assumptions of institutionalist and radical theory into the overly restrictive model of the neoclassical paradigm, a "flexible" general wage theory can be developed. Specifically accounting for imperfect product and labor markets produces a wage theory capable of defining the complex links between human capital, industry and occupational attachment, and the distribution of earnings.

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[1] For the best discussion of the competition, see David M. Gordon, Theories of Poverty and Underemployment (Lexington: D.C. Heath, 1972).

[2] Thomas Kuhn, The Structure of Scientific Revolutions (Chicago: University of Chicago Press, 1962).

In the general theory developed here a human capital earnings function is modified to allow for institutional barriers to industrial and occupational access along racial and sexual lines. The independent effects of industry characteristics such as unionization, concentration, profits, and capital-intensity also enter into the wage model.

Wage Theory and the Study of Poverty

A correct specification of the wage determination process is of more than academic interest. A good part of the government's antipoverty strategy of the 1960s was based on labor market studies. Translated into public policy, human capital research contributed to the emphasis on manpower and human resource development programs. Along this line, the so-called war on poverty was designed to "find new means for offering disadvantaged groups in urban and rural America a chance to develop their own capacities and become productive members of our society."[3] Federal outlays for all manpower activities rose steadily during the latter part of the decade in response to the presumption "that education and training are especially effective ways to bring people out of poverty."[4] Programs totalling only $184 million dollars in 1964 grew to nearly $2.4 billion by 1970.[5]

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[3] "The Budget Message of the President," The Budget of the United States Government, Fiscal Year 1970 (Washington, D.C.: U.S. Government Printing Office, 1969), p. 47.

[4] Thomas I. Ribich, Education and Poverty (Washington: Brookings Institution, 1968), p. 1.

The results of this effort were mixed. The government's attempt to "upgrade," "rehabilitate," "train," "retrain," "integrate," "reintegrate," and "prepare" the poor for the job market was often in vain. The payoff in terms of employment gains and increasing earnings frequently failed to live up to expectations. No matter how measured, the cost of a particular program often exceeded the benefits. Many programs had low job retention rates and often entrants did not complete their training cycle. In other cases trainees completed a manpower program only to find it impossible to gain adequate employment.[6]

Particular manpower programs failed because of insufficient funding, lack of coordination, inadequate training, and poor forecasting of job opportunities. But even the successes brought little reason for enthusiasm. For those who completed MDTA training in the middle of the 1960s, only three out of five advanced in pay, and the increased earnings were quite small. According to the largest study of MDTA, involving over 100,000 institutional training graduates, the average wage for males after training was $2.06 an hour, 27 percent higher than the average pretraining wage. For females, the post-training wage was raised to $1.53, less than 20 percent above pretraining levels and below the then prevailing federal minimum wage.[7] What is worse, these statistics apply only to those who actually completed a manpower program and found jobs. Thousands of other failed to complete programs and others finished and could find no suitable employment.[8]

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[5] Sar A. Levitan, "Manpower Programs Under Republican Management," Poverty and Human Resources, March-April, 1970, p. 12.

[6] In a comprehensive analysis of the institutional portion of the MDTA program it was found that over 30 percent of the trainees dropped out before completing vocational training and only 58 percent found jobs related to their training curriculum. For a comprehensive overview of the manpower programs in the 1960s, see Sar A. Levitan and Garth L. Mangum, Federal Training and Work Programs in the Sixties (Ann Arbor: Institute of Labor and Industrial Relations, 1969).

What explains the apparently low returns on investment in manpower programs? One explanation, of course, is that existing programs actually add little to the "human capital" of the disadvantaged. Much more extensive human resource programs are necessary before satisfactory returns can be anticipated. The other explanation rests on the hypothesis that a lack of human capital is not the major barrier to economic success for the poor. Augmenting an individual's stock of human capital, it may be argued, yields an insignificant marginal return because employment opportunities are nonexistent or highly restricted. The "low-wage" workforce may possess the human capital characteristics of higher paid members of the labor force, but fail to earn larger incomes because of geographical immobility, the high cost of job information, or racial and sexual discrimination. Low relative earnings can result from the "crowding" of a subset of the workforce into a limited number of industries and occupations.[9] Denied access to other economic sectors for which they are qualified on the basis of human capital, members of the "low-wage" workforce may be competing with each other for the limited supply of jobs in the sectors open to them. In this case, the maintenance of an "oversupply" of workers in the "low-wage" sector may be the primary reason for low wages, not a lack of human capital. In addition, the industries to which economic minorities are restricted may consist of marginal firms. operating within an economic environment characterized by low capital-labor ratios, strong product market competition, and weak unions. For any given degree of "crowding," firms in less "permissive" economic environments may offer lower wages. Poverty earnings will then be a function of social "underemployment" rather than personal "underinvestment."

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[7] U.S. Department of Labor, Manpower Administration, "The Influence of MDTA on Earnings," Manpower Evaluation Report, No. 8 (Washington: U.S. Government Printing Office, December 1968), p. 18.

[8] In place of institutional manpower programs, on-the-job training funded by the federal government has provided more people directly with jobs. But according to a GAO report, the federally-funded on-the-job training program is no more than a transfer system whereby the government pays for specific job training which would normally be provided by the cooperating firm in spite of the program. The General Accounting Office uncovered the fact that: "OJT contracts had served primarily to reimburse employers for OJT which they would have conducted even without the government's financial assistance. These contracts were awarded even though the intent of the program was to induce new or additional training efforts beyond those usually carried out." See U.S. General Accounting Office, "Improvements Needed in Contracted for On-the-Job Training under the Manpower Development and Training Act" (Washington: U.S. Government Printing Office, 1968).

"Relative Underemployment" can be said to exist when an individual qualifies for higher wage employment on the basis of human capital but is denied access to it on other grounds. If underemployment is widespread among low-wage workers, the problem of low-wage employment is then only partly the effect of inadequate human capital. In this case manpower programs will have a limited ability to make improvements in the earnings of the low-paid.

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[9] The "crowding" hypothesis can be traced to F.Y. Edgeworth, "Equal Pay to Men and Women," Economic Journal, December 1922.

To what extent low wages reflect inadequate amounts of human capital versus restricted access to employment opportunity can only be ascertained through an empirical investigation which permits both factors to simultaneously enter the analysis. This is the reason for developing a testable "general" wage theory. Measuring the effect of human capital on the wage rate relative to the effects of industry variables and restricted employment opportunity is the necessary prerequisite for understanding both the promise and the limitations of manpower policy. Beyond this, the testing of a general wage theory focuses attention on the factors which are most important in the wage determination process for all members of the workforce. Such research can empirically account for the major variables Thurow had in mind when he concluded that "the distribution of human capital is an important ingredient in the distribution of income, but it is not the sole ingredient. The actual dispersion of income is much greater than would be predicted by the distribution of human capital."[10]

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[10] Lester C. Thurow, Poverty and Discrimination (Washington: The Brookings Institution, 1969), p. 109.

The Design of the Study

The dissertation proceeds in the following way to construct and test a general model of wage determination. The major strands of a general wage theory are discussed in Chapter II. Marginal productivity theory, the institutional analysis, human capital theory, and social stratification hypotheses are initially discussed. Each theory is carefully weighed in order to glean material useful for developing a testable wage determination model.

The general model is developed in Chapter III. A complete theory of wage determination is first constructed which takes as its premise a "deterministic" view of social relations. The distribution of earnings is made a function of four exogenous variables: race, sex, social class, and innate ability. Following this a specific testable model is derived based on human capital, institutional, and stratification hypotheses. The specific model is constructed so as to hold human capital constant allowing the earning effect of industry and occupation "crowding" to be measured. From this a reduced form earnings generating function is developed. Chapter IV discusses the econometric techniques used to measure the independent effects of human capital and "crowding." Attention is paid to the potential problem of multicollinearity and the statistical procedures used to overcome them.

The statistical results follow in Chapter V. Regressions are presented for five separate occupation groups which span the range of all specific occupations in the United States. Individual regressions are reported for each race-sex group as well as pooled race-sex equations. In addition pooled regressions are presented which cover the whole spectrum of occupations. The effect of individual human capital, industry, stratification, and working conditions variables is discussed.

An evaluation of the empirical results follows in Chapter VI. Here the regressions are interpreted so as to parcel out the variance in earnings due to human capital factors as a whole viz-a-viz labor force stratification. Wage "ranges" are established for each occupation group and each race-sex group based on a technique which allows the human capital variables to be held constant while the industry and stratification variables are permitted to vary together according to empirically derived coefficients.

The final chapter is devoted to general conclusions and policy implications. Emphasis is placed on the role of manpower policy in the general antipoverty strategy. Some of the implications for training programs and income maintenance schemes are explored. Finally, there is some speculation as to the justification for the present distribution of earned income, given the empirical results found in this analysis.

There are two appendices in addition to the seven chapters. Appendix A contains a description of the integrated macro-micro data set with a discussion of its construction. Variables used in the regression analysis are defined and the shortcomings in each is noted. Appendix B contains the means and standard deviations for each regression as well as a complete set of zero-order correlation matrices for all of the empirical results.

CHAPTER II

EXISTING THEORIES OF WAGE DETERMINATION

Individual prices reflect a near infinite set of past, present, and even future events. Previous capital expenditures, the whole galaxy of current prices of complementary and substitute products, and expectations about future prices all impinge on the current market value of each good. Consumer attitudes, changing tastes, government subsidies, tariff policy, antitrust action and hundreds of other factors interact to determine millions of prices. Nevertheless, the key factors which determine the price of most final and intermediate goods are well-known.

Yet economists have always been perplexed by one special case: the price of labor.

> Marshall, Pigou, Taussig, and other leading theorists were troubled by the "peculiarities" of the labor market--the fact that the worker sells himself with his services, that his immediate financial need may place him at a disadvantage in negotiating with employers, that he is influenced by nonpecuniary motives, that he has limited knowledge of alternative opportunities, and that there are numerous objective barriers to free movement of labor.[1]

Numerous attempts have been made to fit the theory of wages into a more general analysis of price. By assuming away a number of the "peculiarities" of the labor market, economists have treated labor in the same manner as other productive inputs in the economy. "The theory of the determination of wages in a free market is simply a special case of the general theory of value," Hicks wrote. "Wages are the price of labour; and thus, in the absence of control, they are determined, like all prices, by supply and demand."[2]

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[1] Lloyd Reynolds, The Structure of Labor Markets (New York: Harper and Brothers, 1951), p. 2.

The history of labor theory is rich in these abstract attempts, but poor in empirical verification. The relative impact of supply and demand forces on the wage rate remains, for the most part, a mystery. Even Hicks admitted that "a long road has to be travelled" before the concepts of wage theory "can be used in the explanation of real events."[3] Barbara Wootton has responded that, "In practice this road seems to have been not only long, but so exhausting that few travellers have attempted it."[4]

Before setting out on this difficult road, it seems good practice to review some of the theories developed in the past. Four broad strands in the development of wage theory can be discerned: (1) marginal productivity theory (2) institutional theory (3) human capital theory, and (4) social stratification analysis. Most wage theory fits into at least one of these categories.

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[2] J.R. Hicks, The Theory of Wages (London: MacMillan, 1932), p. 1.

[3] Ibid., p. 10.

[4] Barbara Wootton, The Social Foundations of Wage Policy (London: Unwin University Books, 1955), p. 12.

What we are ultimately searching for is a theory that will explain the empirically observed distribution of personal earnings. Furthermore such a theory must be capable of describing and interpreting the relationship between the personal characteristics of the individual worker and the wage he or she receives in the marketplace. Of particular concern is the relationship between the wages received and a subset of personal characteristics which we shall call the "endogenous productivity characteristics" of the individual.

By the term "endogenous productivity characteristics" we shall refer to the innate and acquired physical and mental attributes of the worker useful as inputs in the production process. This term is synonymous with the term "human capital" when defined narrowly "as an individual's productive skills, talents, and knowledge."[5] This new terminology is introduced because the term "human capital" has been broadened in some recent literature to include such factors as race, sex, and the physical attractiveness of the individual. While these factors may be important in determining the distribution of earnings, we find it useful to separate out the personal characteristics which would have no relationship to the distribution of earnings in a "blind" economy--an economy in which the productivity of an individual was not related to color, sex, or physical beauty.[6] Given this understanding the terms "endogenous productivity characteristics" and "human capital" will be used interchangeably.

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[5] Lester C. Thurow, Investment in Human Capital (Belmont: Wadsworth Publishing Co., 1970), p. 1.

[6] This, of course, should not be construed as to deny the importance of these factors in the actual distribution of earnings.

In the next section we shall introduce the term "endogenous productivity" which relates to the potential output of an individual given his or her endogenous productivity characteristics. Endogenous productivity can be shown to be theoretically distinct from the more common term, marginal productivity of labor.

Marginal Productivity Theory

Much of the debate over the distribution of earnings rests on a more fundamental theoretical debate concerning the usefulness of marginal productivity theory. Consequently the theory provides a good starting point for any discussion of wage determination.

Orthodox or traditional wage theory rests on the fundamental proposition that labor is paid its marginal product. "Workers are paid according to how much they contribute to marginal increases in output. If increasing the number of employed workers by one worker would increase output by $5,000, workers should be paid $5,000."[7] If there are no additions to complementary inputs in the production process, the wage of the "marginal" worker and all intramarginal workers

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Physical attractiveness, for instance, may be ~~the~~ most important personal attribute in some lines of work. Whether an individual receives a particular job or not may be a function of physical attractiveness and the actual market value of an individual in certain occupations is a function of such factors as well. The distinction between skill, for instance, and racial and sexual characteristics is clear enough; physical attractiveness falls into a grey area somewhere in-between.

[7] Lester Thurow, Poverty and Discrimination, p. 26.

will be exactly equal to the full measure of any additional output.

This result follows according to marginal productivity theory assuming no barriers to labor mobility, a homogeneous labor force, and assuming that all employment yields homogeneous nonpecuniary utility (or disutility). Where the product market is characterized by reasonable competition and labor is freely mobile between employers, the wage rate will equal the value of the marginal physical product.

$$w_i = VMP_i = (MPP_i \cdot P)$$

Where the product market is characterized by monopoly elements, the equilibrium wage will equal the marginal revenue product.

$$w_i = MRP_i = (MPP_i \cdot MR)$$

In either case an employer will not hire an additional worker if revenue generated by that individual is less than the addition to his wage bill. This assures the wage of labor will never be above its marginal revenue product, at least as long as employers attempt to maximize profits. The assumption of competition among employers for labor services, on the other hand, assures the wage will not fall below labor's marginal revenue product, and in the case of perfect product markets, not below VMP.

Under conditions of monopsony in the labor market, labor is paid less than its marginal revenue product.

$$w_i < MRP_i$$

Monopsonistic employers face a rising supply curve rather than an infinitely elastic supply of labor. Additional workers can only be obtained by increasing the wage. In the absence of wage "discrimination," the marginal cost of labor increases by more than the wage bill paid to the marginal worker. The employer has to pay the higher wage rate not only to the additional worker, but to all of his workforce. Under these conditions, the marginal cost of labor will lie above the wage rate, and equilibrium will therefore be reached at a point where the marginal productivity of labor exceeds the wage level.

The traditional analysis of wage determination has normally been applied at either the level of the aggregate economy or at the level of the firm; marginal productivity theory was not specifically developed to explain the personal distribution of income. At the level of economy, the supply of labor is assumed perfectly inelastic or upward sloping. In this case the theory is useful as a theory of aggregate wages. At the level of the individual firm, the supply of labor is assumed perfectly elastic (with the exception of the monopsony case) and the theory describes the level of employment in each firm.

As long as there is perfect mobility of labor and labor is homogeneous, there will exist a unique market clearing wage throughout the economy. Each worker will receive exactly the same remuneration[8] and each firm will hire just enough labor at this rate so as to keep marginal revenue product (or the value of marginal product) from falling below the market wage.

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[8] This again assumes that all jobs have homogeneous nonpecuniary utility. Where this assumption does not hold, "compensatory" wage

Classical marginal productivity theory paid little attention to the characteristics of labor supply; labor was assumed homogeneous throughout the economy or homogeneous within major categories or broad occupations. The quality of labor was consequently accepted as given. It was assumed that workers of a given quality could move from one employer to another without interference. Relaxing the labor homogeneity assumption, but retaining the assumption of perfect mobility, yields a "modern" marginal productivity theory which is theoretically capable of describing the personal distribution of earnings among workers with different levels of human capital. As Thurow has noted, "In an economy with perfect competition and in equilibrium, the distribution of marginal products is identical with the distribution of earned income."[9] And,

> the supply and demand for labor with differing skills and knowledge would determine the marginal product of each variety of labor. Individual earnings would equal their marginal products, and the allocation of human capital would determine the distribution of earnings.[10]

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differentials develop to account for differences in the nonpecuniary advantages or disadvantages of particular jobs.

[9] Lester Thurow, Poverty and Discrimination, p. 29.

[10] Ibid., p. 96.

Given free access to the labor and product markets consistent with their human capital, workers will be distributed so as to maximize the total value of output and in turn each worker's marginal productivity and wage. If the equilibrium is disturbed in some way (by the introduction of new technology, for instance), the labor force will be reallocated so that once again the ordinal ranking of endogenous productivity characteristics is consistent with maximized output. From an efficiency standpoint, the wage structure under these conditions will be optimal. From the viewpoint of "equity," the personal distribution of earnings will be colinear with the distribution of human capital.

The colinear relationship between earnings and human capital will occur whether the product market is characterized by perfect competition or monopoly. However once monopsonistic elements are introduced into the labor market, colinearity disappears. Labor of given quality will receive less in the monopsonistic firm and the differential will persist as long as mobility to other firms is restricted. Where labor differs as to quality, the statistical colinearity between human capital and earnings depends on which group of workers is restricted to the monopsonized sector. In any case the hypothesized link between endogenous productivity characteristics and wage rates no longer holds.

The usefulness of the marginal productivity theory as a theory of the distribution of earnings rests on the assumption of perfect mobility of labor. To the extent that this assumption is violated in the real world, the theory fails to adequately explain wage determination. It fails for it specifies only one of the two critical linkages between the distribution of earnings and the distribution of human capital. The linkage between the wage rate and the marginal revenue product of labor is well described by the theory. What is not specified is the connection between MRP and the level of human capital. This link relies on the nature of the labor market. It is possible that every worker is paid his marginal revenue product at the same time that his marginal revenue product bears no relationship to his level of human capital. Given imperfect mobility of labor, it is possible that:

$$(1)\ w_i = MRP_i$$

$$(2)\ MRP_i \neq f(\text{Human Capital})$$

In this case a knowledge of the distribution of human capital would be insufficient to describe the distribution of wage income.

At this point it is helpful to introduce a new term in order to differentiate between the actual marginal revenue product of each worker and the hypothetical marginal revenue product each worker would receive if there were no barriers to labor mobility and the economy were in equilibrium. This hypothetical marginal revenue product shall be referred to as the "endogenous revenue product." The endogenous revenue product of individual i (ERP_i) is the marginal revenue product individual i, possessing endogenous productivity characteristics, C_j, would receive if he were to compete freely in the labor market with all other workers with characteristics C_j.

To clarify the distinction assume that all labor is of homogeneous quality and there are two firms operating with identical labor demand curves. Under the condition of perfect labor mobility, all workers will earn a wage, w_i, equal to the economy-wide marginal revenue product, MRP*.[11] Now introduce an arbitrary barrier to labor mobility which results in three-fourths of the total labor force being restricted to Firm B. (See Figure 2.1)

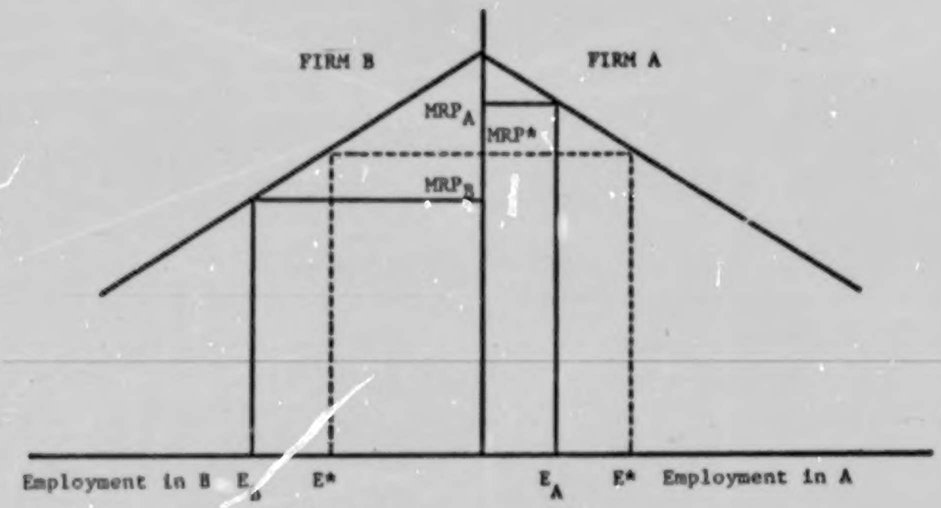

Figure 2.1 Marginal revenue products with labor supply restrictions

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[11] This result holds even if the two firms face different product demand curves. In this case the total labor force will be allocated so that w_i = MRP_i* in each firm; shifts in the level of employment in each firm will assure this result.

Under these circumstances the wage received by workers in Firm A will be equal to MRP_A while the wage received by workers restricted to Firm B will be equal to MRP_B. In this case the colinearity between endogenous productivity characteristics and actual marginal revenue product is nonexistent. The endogenous revenue product of each worker is equal to MRP* while the actual marginal revenue products are MRP_A and MRP_B.

For workers in Firm A:

$$w_i^A = MRP_A > MRP^* \equiv ERP_i$$

For workers in Firm B:

$$w_i^B = MRP_B < MRP^* \equiv ERP_i$$

To repeat, marginal productivity theory describes the link between w_i and MRP_i, but fails to describe the relationship between MRP_i and ERP_i. Thus the traditional theory cannot be used as an earnings distribution theory where labor immobility is extensive. To summarize:

Under the assumption of perfect labor mobility:

(1) $w_i = MRP_i$

(2) $MRP_i = ERP_i$

(3) $ERP_i = f(C_j)_i$

(4) $w_i = f'(C_j)_i$.

Under the assumption of imperfect labor mobility:

(1) $w_i = MRP_i$

(2) $MRP_i \neq ERP_i$

$$(3)\ ERP_i = f(C_j)_i$$

$$(4)\ w_i \neq f'(C_j)_i$$

and the marginal productivity theory is no longer a theory of the distribution of earnings.

Human Capital Theory

Traditional marginal productivity theory rests on two fundamental assumptions: (1) homogeneous labor supply, and (2) perfect labor mobility. Institutional wage theory, to be discussed in the next section, retains the first assumption but rejects the latter. Human capital theory does the reverse. It extends the marginal productivity theory to account for differences in labor quality, but maintains that all workers of a given quality compete in the same market. In assuming no barriers to labor mobility (for labor of the same quality), the human capital theory is fully consistent with traditional wage theory. All workers who have the same endogenous productivity characteristics produce the same marginal revenue product and earn the same wage.[12] Thus

$$w_{ij} = MRP_{ij} = ERP_{ij}$$

for all individuals, i, with human capital characteristics, j. For the labor force as a whole, the distribution of earnings becomes a function of the distribution of human capital.

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[12] This holds, once again, except in the case of monopsony.

Renewed interest in the role of labor in the production process began in the late 1950s. Edward Denison, in attempting to account for the sources of economic growth in the United States in the 1929-1957 period, found that he could explain only 31 percent of the increase in output if he were forced to assume that productivity of labor did not change.[13] T.W. Schultz, in a classic article on the same subject, showed that gains in output over time could not be solely attributed to increases in physical capital.[14] The need arose for a framework which stressed "human productivity" as a source of economic growth. The idea of human capital was introduced into economic analysis.

The new approach to the study of wages and employment did more than merely add the dimension of labor quality to the traditional productivity theory. It focused on the investment process by which a given stock of human capital is accumulated. "Human capital models," according to Mincer, "single out individual investment *behavior* as a basic factor in the heterogeneity of labor incomes."[15] Empirically, the human capital approach attempts to measure the individual and social rates of return from investments in formal education, on-the-job training, vocational education, health care, additions to labor market information, and migration. Assuming away labor market imperfections, some research is even attempting to infer the distribution of abilities from the distribution of earnings.[16]

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[13] Edward F. Denison, *The Sources of Economic Growth in the United States and the Alternatives Before Us* (New York: Committee for Economic Development, 1962), p. 266.

[14] T.W. Schultz, "Investment in Human Capital," *American Economic Review*, March 1961. Also in "Investment in Man: An Economist's View," *Social Service Review*, June 1959.

[15] Jacob Mincer, "The Distribution of Labor Incomes: A Survey," *Journal of Economic Literature*, March 1970, p. 6.

The Basic Human Capital Model

Borrowing from Mincer and Becker, the fundamental human capital equation can be written as in equation 1.

$$\text{(1)} \quad \log E_x = \log E_0 + rx$$

where E_x = earnings generated by investment x

r = market discount rate or the internal rate of return on investment x

E_0 = earnings generated by other factors than investment x

According to this simple formulation the earnings distribution is a function of investments in education, training, and other individually acquired human capital components (x) plus a function of E_0 which includes innate or natural ability and other factors. Given a market determined r and assuming E_0 constant, differences in earnings will be directly related to differences in the amount of human capital acquired by each individual.

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[16] Mincer notes two articles in this genre: K. Bjerke, "Income and Wage Distribution," Review of Income and Wealth, November 1970; A.D. Roy, "The Distribution of Earnings and Individual Output," Economic Journal, September 1950.

In addition, according to Mincer, equation (1) can account for imperfections in the product market, in the labor market, and in the market for human capital investment funds. Unfortunately, however, it does this in patchwork fashion. As Mincer notes

> If the competitive assumptions are relaxed, internal rates of return cannot be equated with the market rate of interest and generally differ among individuals. Equation (1) can remain serviceable, however, with r interpreted as a group average internal rate of return on (investment x), while individual differences in r and in log E_0 are impounded in a statistical residual.[17] (emphasis added)

This solution to the market imperfection problem is useful as long as the degree of imperfection is minor.[18] But if a large part of the variance in individual earnings is due to labor market imperfections, the human capital model fails to specify the critical variables and in fact may draw attention away from them. A similar "error" term or shift coefficient could have been applied to the marginal productivity model, but there too, the patchwork would have been for the sake of "realism" without yielding any analytic improvement in the model.[19]

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[18] Two points are in order. In private correspondence, Professor Harold Levinson has noted that even this formulation by Mincer is not quite correct. The group average r may also be affected by labor market imperfections. Restrictions in supply for a whole occupation, for instance as in the case of the building trades or the medical profession, would shift r itself rather than show up in the residual. In this case, he argues, equation (1) would be assigning some portion of E_x to investment x which is in fact related to institutional factors rather than investment.

The second point regards the relationship of this formulation to the differentiation between "endogenous revenue product" and "marginal revenue product" discussed in the section on the marginal productivity theory. Clearly ERP is analogous to Mincer's "group average internal rate of return" while the "statistical residual"

Reinterpreting equation (1) indicates that there are two factors of importance in wage determination. One is the amount of investment in human capital and the other is the rate of return earned on the investment. Or as Thurow has formulated:

> The value of human capital can be divided into price and quantity components. Education and on-the-job experience provide the principal means for increasing the quantity or quality of an individual's capital. Migration, improvements in information, and the elimination of market imperfections, such as prejudice, are the chief instruments to raise the price for existing capital. Although the price factor would not exist in perfect markets where all were paid equal amounts for the use of identical skills, in imperfect markets it is an important element in valuing human capital.[20]

The distinction is important and lies at the crux of much confusion over the usefulness of the human capital needed. Depending on the degree of imperfection in the labor markets, the effect of r on E_x

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accounts for variance in MRP around ERP. In this case, r = ERP while (MRP-ERP) = ϵ, the statistical residual.

[19] In the recent literature there has been some attempt at explicitly integrating market imperfections into human capital theory. Much of this has focused on job search behavior. The job search is viewed as another form of investment in human capital where the costs of the search, including opportunity costs, must be weighed against potential discounted future earnings. While this tends to account for the problem of "imperfect" markets due to information cost, it fails to solve the larger problem of imperfect mobility due to market discrimination. See Charles C. Holt and Martin H. David, "The Concept of Job Vacancies in a Dynamic Theory of the Labor Market" (Madison: Social Systems Research Institute, University of Wisconsin, 1965) and Dale T. Mortensen, "A Theory of Wage and Employment Dynamics"; and Donald A. Nichols, "Market Clearing for Heterogeneous Capital Goods," in Edmund S. Phelps, Microeconomic Foundations of Employment and Inflation Theory (New York: Norton, 1970).

[20] Lester C. Thurow, Poverty and Discrimination, op. cit., p. 69.

may outweigh the effect of x. How much each individual invests in human capital may not be as important as the rate of return he or she receives on that investment. For a given population the distribution of r's may be such as to reduce significantly the covariance between the distribution of x's and E_x's. In this case,

> The concept of human capital loses its economic meaning. It no longer reflects productive capacities, and it no longer can be viewed in the same light as physical capital. In a fundamental sense the problems of determining individual incomes cease to be economic and become sociological or institutional.[21] (emphasis added)

Empirical Studies of the Human Capital Earnings Function

The development of the human capital function was followed by a steady flow of empirical studies aimed at quantifying the determinants of earnings. Many of the earlier studies attempted to measure the private and social returns to education by estimating the discounted present value of investment in formal schooling.[22] Other studies more explicitly analyze the distribution of income and earnings with human capital factors as the independent variables.

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[21] Lester Thurow, Investment in Human Capital, op. cit., p. 18.

[22] Some of the more important studies in this area include: Gary Becker, Human Capital (New York: National Bureau of Economic Research, 1964); W. Lee Hansen, "Total and Private Rates of Return on Investment in Schooling," Journal of Political Economy, April 1963; Orley Ashenfelter and J.D. Mooney, "Some Evidence on the Private Returns to Graduate Education," Southern Economic Journal, January 1969; M. Blaug, "The Private and Social Returns to Investment in Education: Some Results for Great Britain," Journal of Human Resources, Spring 1967; A.B. Carroll and L.A. Ihnen, "Costs and Returns for Two Years of Postsecondary Technical Schooling," Journal of Political Economy, December 1967; W. Lee Hansen, Burton Weisbrod, and W.J. Scanlon, "Schooling and Earnings of Low Achievers," American Economic Review, June 1970; E.F. Renshaw, "Estimating the Returns to Education," Review of Economics and Statistics, August 1960; E.A.G. Robinson and

Using diverse earnings functions, a number of studies have attributed a large part of the explained variance in incomes to differences in education. Morgan, David, Cohen, and Brazer, using multiple classification analysis on national survey data, found the most important factor determining hourly earnings of household heads is an education-age interaction term.[23] The beta coefficient on the education-age term was .234, highest among the fourteen variables in their analysis including sex, occupation, race, geographic mobility and several general demographic factors.[24] Using the 1/1000 1960 Census sample, Giora Hanoch finds a relatively high "marginal product" for education, although education appears in his formulation to be subject to diminishing returns.[25] The result is similar to Weisbrod's findings for private rates of return on different levels of schooling.

J.E. Vaizey (eds.), The Economics of Education (London: St. Martins, 1966); Gerald Rose, Differential Returns to Investments in Human Capital in the Academic Labor Market, University of California (Unpublished Ph.D. dissertation, 1969).

[23] James N. Morgan, Martin H. David, Wilbur J. Cohen, and Harvey E. Brazer, Income and Welfare in the United States (New York: McGraw-Hill, 1962).

[24] Ibid., p. 48.

[25] See Giora Hanoch, "Personal Earnings and Investment in Schooling," Ph.D. dissertation, University of Chicago, 1965; also, "An Economic Analysis of Earnings and Schooling," Journal of Human Resources, Winter, 1967.

Lowell Gallaway,[26] H.S. Houthakker,[27] Elizabeth Waldman,[28] and Herman Miller[29] have all attached a great significance to formal education in explaining the distribution of earnings.

More recently, however, a good deal of research has called into question the great importance of formal education in earnings functions. This is especially true of studies directed at explaining the income differences of whites and nonwhites. Using a 77 cell education-occupation matrix, Bluestone *et al*. find that a maximum of 30.3 percent of the income differential between full-time, full-year employed white and black men can be explained by the quantity of formal schooling.[30] Two-thirds or more of the differential is due to occupational discrimination (education statistically held constant), discrimination in industrial attachment, and human capital factors not included in formal schooling. Only 2.8 percent of the total differential between full-time employed white men and white women can be explained by formal schooling; 14 percent of the differential between black women and white men. Donald Katzner found a similar result for the white/nonwhite earnings differential.[31] Michelson, criticizing earlier studies for failing to account correctly for the interaction between education and occupation, finds the effect of schooling on earnings to be even smaller.[32] Using a larger matrix, Michelson shows "that only 16 percent of the earnings differential between whites and nonwhites would have been corrected by equal schooling categories, employing current (1959) earnings per year of school for each racial group."[33]

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[26] Lowell Gallaway, "The Negro and Poverty," *Journal of Business*, January 1967, pp. 27-35.

[27] H.S. Houthakker, "Education and Income," *Review of Economics and Statistics*, February 1959.

[28] Elizabeth Waldman, "Educational Attainment of Workers," *Monthly Labor Review*, February 1969.

[29] Herman P. Miller, "Annual and Lifetime Income in Relation to Education," *American Economic Review*, December 1960.

[30] The calculations were made from data obtained in the 1967 *Survey of Economic Opportunity*. These specific calculations can be obtained from the authors. Similar results in a more disaggregated model can be found in Barry Bluestone, Mary H. Stevenson, and William M. Murphy, *Low Wages and the Working Poor* (Ann Arbor: Institute of

In response to the evidence that formal schooling explains only a fraction of the earnings differential, especially among race-sex groups, additional human capital variables have been added to the earnings function. A catalog of these variables compiled by Hansen, Weisbrod, and Scanlon includes: (1) physical condition, including general state of health and specific disabilities; (2) mental capability, reflecting inherited potential; (3) learning and experience, determined not only by the quantity and quality of formal

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Labor and Industrial Relations, Research Division, University of Michigan-Wayne State University, 1973).

[31] Donald A. Katzner, Theory and Cost of Racial Discrimination, Ph.D. dissertation, University of Pennsylvania, 1966.

[32] Stephan Michelson, Incomes of Racial Minorities (Washington: The Brookings Institution, 1968) unpublished manuscript.

[33] Ibid., pp. 2-35.

education, but by specific job training and job experience; (4) psychological characteristics, among them motivation and ability to communicate and cooperate in work situations; and (5) family environment, reflecting informal learning, socialization, and "contacts."[34]

The study by Morgan, et al. attempted to explain hourly earnings using proxies for many of these factors. While "supervisory responsibility," "attitude toward hard work and need-achievement score," "interviewers' assessment of ability to communicate," and "physical condition" were statistically significant, each of these factors explained only a minute fraction of the variance in wage rates after controlling for other variables.[35] Altogether their fourteen variables including education and age, sex, occupation, race, and geographical location (in addition to the preceding variables) accounted for 34 percent of the variance in wage rates. Two-thirds remained unexplained.

Other researchers have continued to add new variables to the basic human capital model in an attempt to explain the variance in earnings. Chief among these are the quality of education, work experience, and on-the-job training. Johnson and Stafford used educational expenditure per pupil as a proxy for "quality" and found

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[34] W. Lee Hansen, Burton A. Weisbrod and William J. Scanlon, "Determinants of Earnings: Does Schooling Really Count?" Discussion Paper, Institute for Research on Poverty, University of Wisconsin, August 1968 (Preliminary Draft).

[35] Morgan et al., Income and Welfare in the United States, Chapter 5.

"that there are high but diminishing marginal returns to investment in school quality."[36] Thurow has used years of experience in the labor force as a proxy for "experience" or on-the-job training.[37] Rees and Shultz find "seniority" with the present employer to be the most significant variable in explaining the wages of workers in their Chicago labor market study.[38] The use of "age" in other studies is intended to act partially as a proxy for experience. In each case, age, experience, general on-the-job training, or seniority has been found significant. Yet with few exceptions even the most complete human capital equation seldom explains more than 35 percent of the variance in income and usually the explanatory power of such models, measured in terms of R^2, is much lower.

Of course, a relatively high R^2 only indicates correlation; it indicates nothing about the causal nature of the relationship or even the direction of causation. This is especially important for human capital functions. In the case of experience, for instance, the problem is severe. There are a number of interpretations of the relationship between experience and earnings, all of which are consistent with the data, but which point to extremely different hypotheses about the determinants of income. One is that experience adds directly to a worker's endogenous revenue product and therefore is a legitimate human capital variable. Another, however, views experience or seniority as reflecting nothing more than institutionalized pay increments based on length of service and set out in collective bargaining agreements or offered by employers to maintain morale. In this case, "experience" may be totally unrelated to changes in an individual's human capital.

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[36] George E. Johnson and Frank P. Stafford, "Social Returns to Quantity and Quality of Schooling," Department of Economics, University of Michigan, 1970, unpublished manuscript, pp. 17-18. Other works on school quality as an input in the human capital equation include: Finis Welch, "Measurement of the Quality of Schooling," American Economic Review, May 1966; and James Morgan and Ismail Sirageldin, "A Note on the Returns to Quality of Schooling," Journal of Political Economy, September-October 1968.

[37] Lester C. Thurow, "The Occupational Distribution and Returns to Education and Experience for Whites and Negroes," Federal Programs for the Development of Human Resources, Joint Economic Committee (Washington, D.C., 1968), pp. 267-84.

[38] Albert Rees and George B. Shultz, Workers and Wages in an Urban Labor Market (Chicago: University of Chicago Press, 1970), pp. 84-85.

Of even greater damage to the human capital interpretation of "experience" is the possibility that the causal link between earnings and experience may actually be reversed. Higher wages may cause longer experience. Workers in "high wage" industries may have lower turnover rates and therefore longer on-the-job experience because there is little room for improving earnings by moving to new employment. Workers in "low wage" industries or firms may feel less attachment to their present employer and search often for new jobs. In this case seniority may be low, but possibly the result of low wages rather than the reverse.[39] In addition, the existence of "internal labor markets" produces a situation where training and experience become a function of being hired.[40]

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[39] Doeringer has shown that this occurs often in ghetto labor markets. In a study of a Boston manpower program, he found that job tenure was directly related to wage level after controlling for other factors. See Peter B. Doeringer, "Manpower Programs for Ghetto Labor Markets," Proceedings of the 21st. Annual Winter Meeting of the Industrial Relations Research Association, pp. 257-267.

Similar problems of interpretation exist with other human capital variables as well. The relationship between years of formal schooling and level of human capital is by no means clear. Bowles, for instance, has begun work on educational production functions to determine what inputs from formal schooling contribute to "productivity."[41] Of special concern is whether schooling actually contributes to the endogenous revenue product of the individual or whether the empirically derived relationship between education and earnings merely reflects the use of formal schooling as a "credential" in the employment screening process. Other human capital variables suffer the same problems of interpretation. General and specific job training, IQ scores, health and disability measures, and factors contributing to geographical mobility all appear to contribute in one way or another to the "explanation" of earnings. But the precise connection between independent and dependent variables remains fuzzy.

The more important problem with the human capital theory remains, however, even if the problem of causal relationships is set aside. Like its predecessor in productivity theory, human capital models fail as a theory of personal earnings where labor markets are imperfect. The use of "race" and "sex" variables as human capital components or "quality" variables clearly improves the fit of so-called human capital functions. But it should be equally clear that such variables are quite distinct from what we have called "endogenous productivity characteristics." Where racial and sexual discrimination exist in the labor market, or where mobility barriers are established through monopsonistic power or trade union practice, the distribution of wage income and the distribution of endogenous revenue products need not be covariant. In this case explicit attention must be paid to the institutional factors in the economy which impinge on the distribution of earnings. If mobility barriers are important in the economy, the *ad hoc* addition of new "human capital" variables may boost R^2 a bit, but will add little to a meaningful explanation of wage determination.

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[40] For the best discussion of internal labor markets, see Peter B. Doeringer and Michael J. Piore, Internal Labor Markets and Manpower Analysis (Lexington: D.C. Heath, 1971).

[41] See Samuel Bowles, "Towards an Educational Production Function," in W. Lee Hansen (ed.), Education, Income and Human Capital (New York: National Bureau of Economic Research, 1970).

The Institutional Approach

Whereas the marginal productivity theory and human capital theory for the most part ignore the existence of barriers to labor mobility, the institutional approach to wage theory begins with the basic position that market imperfections are sufficiently widespread to cause wage rates to deviate significantly from their free market equilibrium levels. Thus, according to institutional theory, an individual's actual marginal revenue product can diverge significantly from his endogenous revenue product.

The institutional approach, developed in the late 1930s, came in response to rising unionism, a growing awareness of monopoly elements in the economy, and increased government intervention in the marketplace. Rather than an immediate concern with the determinants of individual earnings, institutional theory has attempted to untangle the various factors which impinge on interindustry and interregional wage distributions. Where the marginal productivity theory focused on _absolute_ wage levels, the institutionalists have been more concerned with _relative_ wages (and changes in relative wages) for similar work. Assuming the "quality" of labor homogeneous within a given occupational range, the institutional approach investigates the impact of such factors as unionization and the effect of "ability to pay" on relative wages. Lacking the theoretical rigor of other approaches to wage determination, the institutional approach compensates with vigorous empirical investigation.

Balkanized Labor Markets

Adam Smith attempted to explain wage differentials by noting "compensating" differences in job content. In contrast, J.S. Mill argued as early as 1847 that wage differentials are due to the absence of competition in the market for labor.[42] Stressing the existence of barriers to occupational entry, Mill pictured the labor market as deeply fragmented with individual workers falling into specifically defined markets. Little intermarket mobility could be expected between "noncompeting" groups of labor. Barriers to mobility between occupations, in Mill's view, were due to the social class structure of what we would today call human capital investment behavior.

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[42] J.S. Mill, _The Principles of Political Economy with Some of Their Applications to Social Philosophy_ in Vol. II, _Collected Works of John Stuart Mill_ (Toronto: University of Toronto Press, 1965). According to Mitchell, the first reference to "noncompeting" groups in labor is found in Mill's lecture notes. See Wesley C. Mitchell, _Types of Economic Theory_, Vol. I (New York: Augustus M. Kelley, 1967), p. 562n.

The theme of barriers to labor mobility is implicit in the institutional analysis. But in place of strict family occupational lines characteristic of a preindustrial era, the modern labor market is "bulkanized" or segmented into many sub-markets by institutionally developed rules, both formal and informal.[43] Entrance into each sub-market, and movement within its internal market channels are often strictly defined. The degree of unfettered choice within the overall labor market is consequently diminished. Those who gain access to restricted markets presumably gain wages higher than they normally would in the face of perfect competition.

Restriction of employment in any one sub-market or firm occurs in one of two ways (or both). In markets controlled by strong employee organizations (e.g. building trades, the medical profession) the actual supply of labor may be restricted to some given level. The intersection between the market demand curve and the "institutionalized" supply curve yields the sub-market wage. In other markets, supply is not explicitly regulated, but the wage level is. In this case the amount of labor employed in the sub-market is a function of sub-market demand and the institutionally set wage. In both cases it is presumed that the resulting wage exceeds the wage that would exist in perfect competition.

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[43] See Clark Kerr, "The Bulkanization of Labor Markets," in E. Wight Bakke, Labor Mobility and Economic Opportunity (Cambridge: The New Technology Press and John Wiley, 1954).

The existence of strong unions on the labor supply side is an important element in the institutional framework. Yet other factors which contribute to the bulkanization of labor markets--racial and sexual discrimination, barriers to geographical mobility, "lock-in" effects of seniority, civil service channels, etc.--contribute to the institutionalist argument that wage rates may reflect other factors beside the endogenous productivity characteristics of labor.

Balkanized labor markets, however, are only part of the institutionalist approach to wage theory. On the demand side, institutionalists argue that firms do not profit maximize, that the marginal conditions needed to maximize profits are not and cannot be known with accuracy, and that firms have other goals with respect to their workforces beside maximizing output at minimum labor cost.[44] Instead of reflecting the lowest wage possible in every instance, firms with an "ability to pay" will often offer higher wages than necessary to secure the quantity of a given quality of labor it desires. In the words of a leading institutionalist, "The major factor [in wage determination] is differences in companies' wage-paying ability, plus in some cases the presence of a union which forces a company closer to the limit of its ability to pay."[45] This stress on "ability-to-pay" has led many empirical studies to focus on those factors related to the well-being of a firm or industry: concentration, profits, capital-intensity, and productive efficiency. Unionization takes on the role of a political power variable in addition to its role in restricting labor supply.

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[44] For the best summary of the institutionalist attack on marginal productivity theory and for one of the strongest rejoinders, see the Richard Lester-Fritz Machlup "debate." This appears in three issues of the American Economic Review, March 1946, September 1946, and March 1947.

An Institutional Model of Wage Determination

Pulling together the separate strands of institutional wage theory allows the development of a unified institutional theory of wage determination.[46] Labor supply is assumed homogeneous in quality but balkanized by factors other than those related to endogenous productivity characteristics. Product markets are differentiated by entry barriers, either accounted for by scale requirements or spatial area limitations.[47] And unions are responsible for either directly limiting labor supply or using their bargaining power to raise wage levels above the competitive norm.

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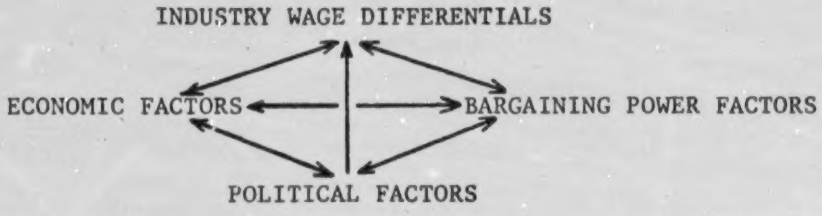
[45] Lloyd Reynolds, The Structure of Labor Markets (New York: Harper and Brothers, 1951), p. 189.

[46] Some of the more important research which went into the institutional synthesis included: John Dunlop, Wage Determination Under Trade Unions (New York: John Wiley, 1944); Arthur M. Ross, Trade Union Wage Policy (U. of California, 1948); Harold M. Levinson, Unionism, Wage Trends, and Income Distribution, 1914-1947 (Ann Arbor: University of Michigan Press, 1951); Lloyd G. Reynolds, The Structure of Labor Markets (New York: Harper and Brothers, 1951); Sumner Slichter, "Notes on the Structure of Wages," Review of Economics and Statistics, February 1950; Lloyd G. Reynolds and Cynthia H. Taft, The Evolution of Wage Structure (New Haven: Yale University Press, 1956); William Bowen, Wage Behavior in the Postwar Period (Princeton: Princeton University, Industrial Relations Section, 1960); Harold M. Levinson, Postwar Movement of Prices and Wages in Manufacturing Industries, Joint Economics Committee, 86th Congress, 2nd Session, Study Paper No. 21, 1960; Albert Rees, "Union Wage Gains and Enterprise Monopoly," Essays on Industrial Relations Research (Ann Arbor: University of Michigan,

Wages are then determined through a complex interaction of economic constraints, political decisions which affect the strength of unionism, and finally the relative bargaining power of labor and management.[48]



At any given point in time, the general level of physical productivity and market demand conditions place an upper limit on the final wage

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Institute of Labor and Industrial Relations, 1961); H. Gregg Lewis, Unionism and Relative Wages in the United States (Chicago: University of Chicago Press, 1963; Harold M. Levinson, "Unionism, Concentration, and Wage Changes: Toward a Unified Theory," Industrial and Labor Relations Review, January 1967; Harold M. Levinson, Determining Forces in Collective Wage Bargaining (New York: John Wiley, 1968).

[47] The argument about spatial limitations of the physical area of a labor market is developed in Harold M. Levinson, "Unionism, Concentration, and Wage Changes: Toward A Unified Theory," op. cit.

[48] This model is most thoroughly discussed in Harold M. Levinson, Determining Forces in Collective Wage Bargaining, op. cit.

bargain. The hypothetical competitive labor supply curve places the lower limit on the wage bargain. The final wage settlement will then lie within this range and be determined by the relative bargaining power of employer and employee representatives and/or the nature of the preference function of management where union strength is either weak or nonexistent.

The institutional synthesis can be depicted as in Figure 2.2. In the short run, firms are faced by a wage range, $W_C - W_M$, where W_C is the reserve price of labor (of a given quality) in the absence of any restriction of labor supply. At a wage below W_C, firms will find no one willing to work. Above W_M, firms will cease all production because $W_M >$ MRP at all levels of output. Through collective

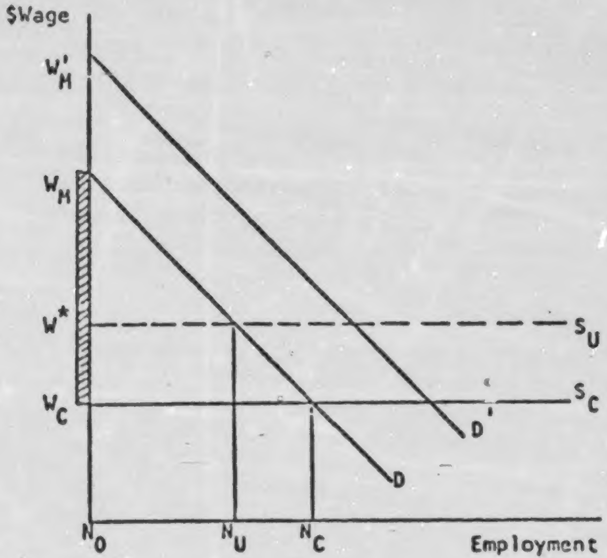

Figure 2.2 The institutionalized wage bargain

bargaining, the labor supply curve will be raised vertically so that the height of S_U above W_C depends on the relative bargaining strength of labor and management. Increases in the marginal physical product of labor (through increases in the capital/labor ratio or technological advances) or increases in marginal revenue (due to changes in market demand conditions) will shift the MRP curve up and the wage band will expand to $W_C - W'_M$. The final wage W* thus depends on economic variables (marginal physical product and marginal revenue) and bargaining power factors. Behind the scenes, the government plays a political role in modifying the relative strength of labor and management.[49]

Even with homogeneous labor supply, wage rates can differ between firms or industries depending on the relative height and slope of the marginal revenue product curves and the relative strength of labor and management. The institutional model consequently predicts the following results:

(1) Individuals barred from protected industries will earn lower wages than individuals in other industries even where endogenous revenue products are equal.

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[49] In the long run W* is indeterminate without knowledge of the elasticity of substitution between capital and labor. Autonomous increases in the price of labor may drive firms to raise the capital-intensity of their production processes. In this case, the S_U curve(s) and demand curves will no longer be independent. The precise wage outcome requires information about the elasticity of substitution between capital and labor and the wage preference function of union leadership.

(2) Wages will reflect industry characteristics as well as the endogenous productivity characteristics of the workforce.

(3) In particular wages of similarly qualified individuals will be higher for those who gain access to unionized industries and industries where competitive pressures are minimized through monopoly or spatial limitations to market entry.

Empirical Verification of the Institutional Approach

With few exceptions data on manufacturing industries have been used to test the institutional predictions. The usual dependent variable is change in average straight-time hourly earnings over time.[50] The critical independent variables have been unionization and concentration while some attention has focused on profits, change in sales, value-added, and capital-labor ratios.[51]

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[50] Changes or increases in average wage rates rather than absolute wage levels have been used in institutional analyses in order to circumvent the problems caused by differences in the "quality" of the labor force in different industries. Presumably while labor quality may vary from industry to industry, changes in the average endogenous productivity of an industry's workforce come only slowly. Thus there should be little relationship between changes in wage rates and changes in the quality of the labor force. Any significant correlation between industry factors and changes in wage rates should consequently be free of hidden correlation with human capital variables. Unfortunately this does not completely solve the problem, however.

[51] For early work using some of these industry factors see: Sumner Slichter, *op. cit.*; John T. Dunlop, "Productivity and the Wage Structure," in *Income, Employment and Public Policy*, *Essays in Honor of Alvin H. Hansen* (New York: Norton, 1948); Joseph Garbarino, "A Theory of Inter-Industry Wage Structure Variation," *Quarterly Journal of Economics*, May 1950.

In an analysis of data for the 1923-40 period, Garbarino found a zero-order correlation of .7702 between the rate of increase in earnings and the degree to which output is concentrated in a few firms.[52] In a similar study of 50 industries covering the period 1933-1946 Ross and Goldner found a very strong correlation between concentration and changes in average straight-time hourly earnings.[53] Significant positive relationships were also found with unionization and growth in employment, although Ross and Goldner admitted that they could not disentangle the independent effects of concentration, employment growth, and unionization. They concluded that concentration and growth provide a "permissive" economic environment within which unions can appropriate a portion of monopoly profits. In a later multiple regression analysis, Bowen confirmed the difficulty of untangling the institutional variables, but found that wages rose more rapidly in industries with rising employment, higher profits, higher concentration ratios and stronger unionization.[54] Finally Levinson confirmed the importance of profits, concentration, and unionization.[55] He found a strong relationship between earnings, lagged profits, and 1954 concentration ratios, but found no general relationship between union strength and wage changes. The importance of union strength per se, he argued, does not show up statistically, but nevertheless exists through pattern and demonstration effects.

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[52] Joseph Garbarino, op. cit., p. 302.

[53] Arthur M. Ross and William Goldner, "Forces Affecting the Interindustry Wage Structure," Quarterly Journal of Economics, May 1950.

[54] William Bowen, op. cit.

[55] Harold Levinson, Post-War Movement of Prices and Wages in Manufacturing Industries, op. cit.

H. Gregg Lewis has derived numerous estimates of the effect of unionization in different sectors of the economy for different historical periods.[56] Most of these estimates use data compiled by a number of his students. Using data developed by Sobotka, Lewis estimated that in 1939 unionization increased wages of common laborers in the building construction industry by approximately 5 percent. Skilled craftsmen, however, members of much stronger unions, were able to raise their relative wage 25 percent through organizing.[57] In bituminous coal, the effect of unionism ranged from a high of over 120 percent in the early 1920s to zero at the end of World War II.[58] The effect of unionization on relative wages in other industries included 10-18 percent in rubber tire manufacturing (1948), 7 percent in wooden furniture manufacture (1950), 19 percent for barbers (1954), and 6-10 percent for hotel employees (1948).

The weighted average effect of unionism on wages in the 12 industry studies Lewis reviewed is 18 percent. In cross-industry global studies of interindustry wage variation, Levinson, Garbarino, and Goldner found an effect of similar magnitude while Ross and Ross and Goldner found a somewhat smaller effect (although biased by the 1945-46 period). Levinson's estimate was in the neighborhood of 17 percent while Garbarino and Goldner were closer to 15.[59]

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[56] H. Gregg Lewis, op. cit.

[57] The construction industry estimates derived by Lewis are based on Stephen Sobotka, "The Influence of Unions on Wages and Earnings of Labor in the Construction Industry," Ph.D. dissertation, University of Chicago, 1952.

[58] Based on Rush V. Greenslade, "The Economic Effects of Collective Bargaining in Bituminous Coal Mining," Ph.D. dissertation, University of Chicago, 1952.

Problems with The Institutional Approach

In relaxing the assumption of labor mobility inherent in traditional wage theory, the institutional approach should be an important addition to an understanding of wage determination. Unfortunately, however, there are a number of problems in institutional analysis which detract from its general usefulness.

One of these is the difficulty in specifying and measuring such abstract factors as "ability-to-pay" and "bargaining power." The use of profit rates and concentration clearly do not serve as strong proxies for either of these and the proportion of employees covered by collective bargaining agreements--the normal measure of "unionization"--certainly leaves something to be desired as a measure of restricted labor supply or bargaining power. Consequently even if industry characteristics seem able to account statistically for differences in wage levels or changes in wage levels, it is difficult to relate the results of the reduced form equation to a specific theory of wage determination.

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[59] These estimates were derived by Lewis by correcting the earlier estimates in the original studies in order to make them consistent. For the detail on these studies, see, Harold M. Levinson, "Unionism, Wage Trends, and Income Distribution, 1914-1917," Michigan Business Studies (Ann Arbor: Bureau of Business Research, Graduate School of Business, University of Michigan, 1951); Joseph W. Garbarino, *op. cit.*; William Goldner, "Labor Market Factors and Skill Differentials in Wage Rates," Industrial Relations Research Association, Proceedings of the Tenth Annual Meeting, 1958, pp. 207-16.

A second problem, at least for present purposes, is that institutional wage theory does not account for the stratification of certain workers into certain industries. It generally assumes imperfect mobility without specifying the parameters of stratification. While there is some theory as to why certain industries become concentrated or unionized, there is practically no hypothesis as to which workers will be employed in the more unionized industries and which in more competitive sectors of the economy. This problem, of course, stems from the fact that institutional theory never was intended as an explicit theory of the personal earnings distribution.

There is an additional problem, however, which is potentially more serious than either of these. It is possible that the institutional model is partially misspecified.[60] The correlation between earnings and institutional variables may be partly spurious hiding a correlation between earnings and endogenous productivity characteristics. Misspecification may result because of the sequential ordering of the acquisition of human capital, the determination of occupation and industry, and the receipt of earnings. If occupational and industrial attachment is a function of the level of human capital, some of the variance in earnings normally attributed to industry characteristics may in fact be due to differences in human capital factors correlated with industry variables, but unspecified in institutional models. More formally, to the extent that (1) this correlation exists and (2) the acquisition of human capital is causally prior to job placement, significant coefficients on industry variables are spurious and due to errors in the specification of the institutional model. In the extreme case, the true relationship is between human capital and earnings and the institutional model vanishes.

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[60] The term "misspecified" in this context does not simply refer to the fact that one or more variables in the model may be specified in the wrong mathematical form (e.g. linear rather than log normal). Rather misspecification refers to the possibility that there does not exist a real causal relationship between the endogenous variable and the several exogenous factors. In this case the significant correlation found between variables is spurious. A correctly specified model would be one in which the causal relationship between variables is theoretically sound.

The use of data on wage changes rather than wage levels does not completely eliminate this problem. The extent of unionization or concentration across industries may be perfectly colinear with the industry distribution of human capital. In this case both industry and human capital variables would equally describe interindustry wage changes and there would be no way *a priori* to determine which is the true relationship. It may be true that larger wage *increases* as well as higher wage *levels* are accorded higher skilled workers.

A fair test of the effect of institutional variables thus requires a model which explicitly accounts for differences in human capital and furthermore specifies the relationship between industry factors and endogenous productivity characteristics. Such a model would improve our understanding of interindustry wage differentials. To go even further and develop a complete and coherent theory of the distribution of personal earnings requires additional information on the social stratification process in labor markets.

Social Stratification Analysis

Sociological literature since the time of Marx is replete with attempts to understand the development and structure of social stratification. Marx's theory of class conflict placed stratification at the root of all social change.[61] He viewed man's relation to the means of production as the primary determinant of economic structure and class differentiation. Emile Durkheim similarly placed great emphasis on the division of labor.[62] Increasing social density, he argued, led to increasing occupational differentiation, lessened social consensus, and altered the nature of social solidarity.

Other sociologists have studied the nature of status and prestige. Weber investigated the relationship between social and economic orders, stressing the importance of status as differentiated from economic standing.[63] Others have attempted to [illegible]stinguish the differences between class, status, and prestige. Within this broad thrust is a more specific inquiry into the roots of social and occupational mobility.[64]

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[61] For an excellent review of Marx's theory of class differentiation, see Reinhard Bendix and Seymour M. Lipset (eds.), Class, Status and Power, "Karl Marx's Theory of Classes" (Glencoe, Free Press, 1953), pp. 6-12.

[62] Emile Durkheim, On the Division of Labor in Society (New York: Macmillan, 1933).

[63] Max Weber, "Class, Status, and Party," in Max Weber, Essays in Sociology (New York: Oxford University Press, 1946).

For present purposes, a narrower perspective on social stratification is necessary. A general theory of the personal earnings distribution requires that the mechanisms of occupation, industry, and wage stratification be clearly described. While this cannot be done here in detail, a brief taxonomy of economic stratification is helpful.

Two distinct mechanisms of differentiation can be identified. One follows from human capital theory and the other from the institutional analysis. The former relates to differential access to human capital; the latter to differences in the rates of return on a given set of endogenous productivity characteristics. Both are related to differences in race, sex, and social class.[65]

(1) Access to human capital. Investment in human capital can vary between individuals for numerous reasons. Differences in time preference, for one, can make a large difference in how much and when

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[64] See, Pitirim A. Sorokin, Social Mobility (New York: Harper, 1927). For a review of social mobility studies, see S.M. Miller, "Comparative Social Mobility," Current Sociology, 1960.

[65] By the term "social class" we shall refer to a group of individuals who generally possess common economic and social characteristics. The key determinants of social class by this definition include income, wealth, consumption, and social status. Social status is normally conferred through one's occupation. The intergenerational transfer of "social class," for empirical purposes, is measured by occupational standing and/or income.

individuals invest in themselves. Differences in ability may affect investment rates as well. Individuals with greater innate ability, for instance, may tend to remain in school longer and invest in more training especially if training and ability interact to produce extraordinary returns. Differences in income-leisure preference may also tend to differentiate human capital investment. In each of these cases, differential amounts of investment may be said to be "voluntary."[66]

There are other cases, however, where differential investment is involuntary and reflects social stratification. Because human capital investment funds are not a "free" good and the market for investment funds is imperfect, social class, race, and sex can enter into the determination of each individual's stock and structure of acquired human capital. The level of private investment often reflects the level of personal income while the level of social investment (e.g. through public schools) is dependent on the social stratification among legal jurisdictions.

Given imperfect human capital markets, wages can differ considerably among individuals even if innate abilities and personal preferences are identical, product and labor markets are perfect, and rates of return are equivalent everywhere for identical levels of human capital. Under these conditions, if access to human capital is influenced by such characteristics as race, sex, and social class, wage differentials will reflect these factors.

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[66] Extreme caution must be exercised in the use of the term "voluntary." An individual's time preference, for instance, probably depends on a whole set of factors, many of which he cannot control. Family attitudes, the social millieu, and economic conditions may all play a role in determining an individual's time preference and income-leisure trade-off. "Culture" obviously influences a person's motivation and may well be associated with social class.

(II) Differential rates of return. Differential amounts of investment are sufficient to produce a stratified wage structure. Yet there is considerable evidence that suggests that wage rates differ extensively among individuals with similar endogenous productivity characteristics. These wage differentials can be viewed as differences in the rate of return on human capital investment.

Some of these differences may be related to traditional institutional factors such as unionization, concentration, spatial barriers to market entry, and imperfect information. Beyond this, however, lies the effect of social stratification on the structure of labor supply. Rather than randomly distributed, rates of return seem to be significantly related to race and sex. Discrimination in the labor market can take a number of different forms each contributing in a distinct way to differentiating rates of return.[67]

Wage rates (or rates of return) can differ among two individuals who perform precisely the same job in the same firm. This type of differential might be termed "pure wage discrimination." The more complicated forms (and possibly the more pervasive) involve restricted access to particular industries, occupations, or firms. Occupational and industrial stratification will result in different rates of return for the same endogenous productivity characteristics and thus play a potentially important role in the distribution of personal earnings. How important restricted access is in determining the distribution of rates of return can only be ascertained through empirical investigation.

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[67] Thurow has attempted to catalog the several types of discrimination found in the labor market and analyze the effect of each. His "catalog" can be found in Lester C. Thurow, Poverty and Discrimination, op. cit., p. 117.

Social Stratification and Wage Theory

Taken to its extreme, social stratification theory stands in direct contrast to neoclassical theory. Where the traditional analysis focuses on maximization behavior subject to economic constraints, stratification analysis ultimately places responsibility on the "constraints" for determining economic outcomes. In terms of the personal distribution of earnings, the key variables in social stratification theory are beyond the control of the individual. To summarize, they include:

(1) Opportunity for private investment in human capital
(2) Opportunity for social investment in human capital
(3) Restrictions to entry into specific occupations
(4) Restrictions to entry into specific industries
(5) Job discrimination within individual firms
(6) Wage discrimination within individual jobs

By allowing these factors to enter the formulation of wage theory, two things are accomplished. First, the barriers to mobility stressed in the institutional analysis ("noncompeting" groups, imperfect labor market information, unionization, and spatial limitations to entry) are extended to include the obviously important factor of discrimination in the labor market. Second, the inclusion of the social stratification variables provides a framework for understanding the specific distribution of jobs and earnings over the distribution of persons. Traditional human capital theory fails to adequately explain the distribution of endogenous productivity characteristics while traditional institutional analyses fail to specify which individuals will gain access to which sectors of the economy. Social stratification theory thus may provide part of the answer necessary to close the system used to explain personal earnings.

There is one important problem with stratification analysis, however. Taken alone it provides no more than a description of the wage distribution at a given point in time. In this sense it is not a "theory" of wages per se. Its key parameters, race, sex, and social class, are not particularly useful by themselves in analyzing changes in the distribution of earnings. Consequently, stratification analysis must become part of a more general theory of earnings if the theory is to yield any more than a static description.

Toward a Complete Theory of Wage Determination

Each of the four existing theories of wages, at least in its "pure" form, exhibits at least one critical shortcoming which prevents it from fully explaining the observed distribution of earnings. Marginal productivity theory fails to account for differences in endogenous productivity characteristics and for barriers to labor mobility. Human capital theory, while rectifying the problem posed by a heterogeneous labor force, fails to pay adequate attention to labor market imperfections. Institutional analysis focuses on the economic results of market imperfection, but fails to adequately control for differences in human capital or describe adequately the personal characteristics responsible for differential access to labor sub-markets. Finally, social stratification analysis, which neither assumes homogeneous labor supply or perfect labor markets, is greatly weakened by its inability to describe the dynamics of wage determination.

Yet each theory provides a potentially vital element in the construction of a general wage model. Productivity theory indicates that *on average* wages will bear a close relationship to labor's marginal product. Further describing the supply side of labor markets, human capital theory predicts that relative earnings will be related to investment in endogenous productivity characteristics. Institutional theory poses the possibility that labor market imperfections will impinge on the wage determination process in such a way that the distribution of earnings (for individuals with similar human capital) will partially reflect industry and occupational attachment. And social stratification analysis extends the traditional institutional analysis to account for variation in human capital investment and different rates of return on capital due to differences in race, sex, and social class.

Each thus provides part of the catalogue of variables which enter into the wage determination process. But the real problem is determining how much of the wage distribution is best described by each theory. The few empirical studies which have attempted to test wage models using variables from more than one theoretical framework have produced somewhat ambiguous results.

The most complete of these is Weiss's study of concentration and labor earnings.[68] Before controlling for personal characteristics and other industry variables in his 1966 micro data study, Weiss found annual earnings of male operatives in unregulated industries to be significantly correlated with both "unionization" and concentration.[69] He reported that, "Unionization seems to raise annual earnings by about 16 percent when concentration is low, but to have no effect when CCR (concentration) is high. Concentration seems to raise earnings by about 33 percent when unions are weak, but by only 13 percent when they are strong."[70] After the addition of personal characteristics (residence, race, age, education, family size, and migration) and other industry variables (employment growth, size of establishment, type of manufacturing, percent male employment, percent

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[68] Leonard W. Weiss, "Concentration and Labor Earnings," American Economic Review, March 1966.

[69] Weiss's actual regression result was:

$$\begin{array}{llllll} Y = 1936 & +\ 53.47\ CCR & +\ 23.74\ U & -\ .4426\ U\cdot CCR & & R^2 = .0401 \\ \quad (280.5) & \quad (7.81) & \quad (4.16) & \quad (.1030) & & N = 5187 \\ & & & & & \bar{Y} = 4419 \end{array}$$

[70] *Ibid.*, pp. 104-105.

skilled employees, percent employment nonwhite, and percent of employees residing in the South), the effects of unionization and concentration decrease significantly. Unionization remains statistically significant ($t = 5.0$) but the coefficient falls to the level where an industry that is 90 percent organized yields earnings which are only 6-8 percent higher than an industry with only half of the employees covered by collective bargaining agreements. Concentration is now only barely significant ($t = 2.1$) and increased annual earnings (resulting from a difference in CCR of 40 points—20 vs. 60) amount to no more than 3 to 5 percent.[71] After the addition of the personal characteristics data, Weiss can explain about 34 percent of the variance in earnings. He concludes that, "The effects of most industry characteristics are nonsignificant and often of unexpected signs after personal characteristics are introduced. In general, employers who for any reason pay high salaries receive 'superior' labor in the bargain. The general picture is one of fairly efficiently working labor markets, even where substantial monopoly may exist."[72]

Weiss's results, however, hardly justify this optimiscic conclusion. For one thing, Weiss specifies the "unionization" variable at the industry level rather than at the micro level. Stafford has shown that the average effect of union membership on relative wages is

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[71] Ibid., p. 108.

[72] Ibid., p. 116.

10-16 percent after controlling for education, age, industry, city size, region, and race when union membership is measured for the individual rather than the industry.[73] In addition, Johnson and Youmans indicate that after controlling for age and education, the effect of unionism is actually double that found in early institutional studies.[74] In their study union membership increases relative wage rates by 34.2 percent. One interpretation of this result is that unionism is a substitute for more education. Unions insulate less educated workers as well as younger workers from the usual effect of education and age on wage levels. A correct specification of the unionization variable might significantly change Weiss's results.

There are other weaknesses in the Weiss study which merit attention. One weakness lies in his sample of industries. By restricting his research to individuals employed in mining, construction, manufacturing, transportation, communications, or public utilities, he fails to account for the full variance in unionization and concentration in the economy. Including workers in other services and in wholesale and retail trade would have expanded the variance in his industry variables and probably would have increased the significance of these factors.[75]

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[73] Frank P. Stafford, "Concentration and Labor Earnings: A Comment," American Economic Review, March 1968.

[74] George E. Johnson and Kenwood C. Youmans, "Union Relative Wage Effects by Age and Education," Industrial and Labor Relations Review, January 1971.

[75] We would expect this result because it is generally known that

Even more important, the specification of the model leaves the results ambiguous. Many of the personal characteristics in the model have little or no relationship to endogenous productivity characteristics and consequently muddy the interpretation that can be given to "fairly efficiently working labor markets." The coefficient of -681.30 on the dummy value for Negro (with t=7.3) indicates a significant market imperfection due to some form of racial discrimination. The same is true for the dummy value for Spanish surname.

Similarly there are a number of industry variables which are significant and reflect market imperfections rather than differences in the endogenous productivity characteristics in the labor force. The sex composition of the workforce in an industry is significant and in the extreme case of perfect sex segregation might yield a difference in annual earnings of $619. Using a dummy variable for durable manufacturing also makes little intuitive sense as a measure of human capital although the coefficient is significant and accounts for a $211 difference in annual earnings.

If these variables are considered as industry characteristics or "stratification" factors rather than as human capital factors, the degree of misallocation in the labor market is much greater than Weiss estimates. Weiss admits as much in his conclusion.[76]

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the service industries and wholesale and retail trade industries are very weakly unionized and relatively competitive at the same time that they are generally low wage. These points should pivot the regression line around giving a higher coefficient (higher slope) on the industry variables.

[76] Weiss, op. cit., p. 115.

> This does not necessarily imply that no misallocation results from high-wage payments in concentrated industries. Labor "quality" in this study includes such personal characteristics as race, which may be quite irrelevant to the objectively evaluated productivity of the laborer involved. It has been suggested that firms with monopoly power use part of their profits to hire congenial or socially acceptable employees, an option not available to employers subject to more stringent competitive pressures. If so, the earnings of labor in monopolistic industries may still exceed its marginal-revenue product, even though they apparently approximate the value of its alternative product.

In this case the institutional factors explain a large part of the variance in the personal earnings distribution after controlling for endogenous productivity characteristics.

Two other recent studies appear to add some collaborative evidence to this conclusion. In their study of the Chicago labor market, Rees and Shultz controlled for age, education, experience, and seniority.[77] They found that among material handlers, the "mean wage of nonwhites is twenty-nine cents below the mean wage of whites. . . . The coefficient of the nonwhite dummy in the regression is a negative thirty-one cents, indicating that only about two cents per hour can be attributed to differences between nonwhites and whites in the other characteristics that enter into the regression."[78] The addition of establishment variables to the Chicago labor market regressions reduced the effect of the race dummy, but did not eliminate its significance altogether. Such a result seems to indicate that part of the variance in racial wage differentials is due to discrimination in access to "high-wage" firms. The remaining differential arises from wage discrimination within each firm.[79]

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[77] Albert Rees and George P. Shultz, Workers and Wages in an Urban Labor Market (Chicago: University of Chicago Press, 1970).

[78] Ibid., p. 106.

An even more recent study by Wachtel and Betsey, using multiple classification analysis on micro data, found a large portion of the residual variance in wage rates (after controlling for education, experience, race, sex, age, and marital status) could be explained by a composite "occupation-industry" variable.[80] Region of employment, city size, and union status were also significant after controlling for personal characteristics.

While both of these studies find large wage differentials related to labor market barriers, neither indicates precisely what factors operate on the demand and supply sides to produce this result. Rees and Shultz used dummy variables to account for "industry" while Wachtel and Betsey relied on dummy variables for occupation-industry combinations. Neither study addresses the question of what industry factors--higher profits, concentration, restricted access, etc.--are responsible for the significant coefficients on "industry."

Beyond the specification problem there is an even greater weakness in all of these recent attempts to generate wage functions: none develop an explicit comprehensive wage theory with which to interpret the reduced form results. Consequently it is difficult, if not impossible, to disentangle the particular effects of human capital variables, other personal characteristics, industry "ability-to-pay" factors, industry and occupation access barriers, and "pure" discrimination. To disentangle these factors and explore the determinants of the personal earnings distribution requires the development of an explicit model and a set of data which includes specific variables for human capital factors, industry characteristics, and stratification effects.

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[79] For similar results see Alice Kidder, "Interracial Comparisons of Labor Market Behavior," Ph.D. dissertation, M.I.T., 1967.

[80] Howard M. Wachtel and Charles Betsey, "Employment at Low Wages," The Review of Economics and Statistics, May 1972.

In essence our quest is to distinguish what forms of labor market segmentation are responsible for the large wage differentials we find between individual workers in the U.S. economy. Segmentation, by our definition, is simply the division of the labor force into "non-competing" groups for any reason: real human capital differences, unequal access to occupations and industries, and differential wages for precisely the same job are all bona fide forms. One particular form of segmentation, however, is singled out for special attention. This form is "stratification" and refers to segmentation based on non-human capital factors. It can be said to exist whenever the labor force is divided on the basis of race, sex, social class, or by institutional factors such as differential access to union membership. Stratification, however, takes a number of forms itself, one of which is "crowding" where workers have differential access to occupations and industries while another is pure wage discrimination within the same industry or occupation. Distinguishing between the effects of "crowding" and "pure discrimination" is often difficult, but an attempt at empirically isolating the two can be made.

In the following chapter, a general model of wage determination is constructed which draws on the strengths of each theory and indicates how the dynamics represented in each theory interact to produce the observed wage structure. In Chapter V a part of this theory is then tested. Attention will focus on the factors which affect the variance in rates of return on given human capital characteristics rather than on the process by which those characteristics are acquired. Thus the analysis will primarily attempt to evaluate the effect of stratification on the personal earnings distribution, given the existing distribution of human capital.

CHAPTER III

A GENERAL THEORY OF PERSONAL EARNINGS DISTRIBUTION

In this chapter a general theory of the personal earnings distribution is developed. The theory is based on concepts of social stratification, institutional economics, and human capital (which in turn embodies the chief tenets of marginal productivity theory). For purposes of empirical testing, a specific wage function based on the "crowding" hypothesis is developed and a reduced form is generated that is consistent with the overall theory. This is done in order to test the social stratification and institutional elements while holding constant the human capital factors.

The neoclassical formulation of economic problems normally assumes: (1) rational individual decision-making, and (2) utility or profit maximization subject to constraint. Both are inherent in the marginal productivity theory and form the foundation for the human capital approach to wage determination.[1] Accordingly, individuals

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[1] In his survey article, Mincer is particularly clear on this matter. He notes that ". . . an important attraction of this theory is that it relies fundamentally on maximizing behavior, the basic assumption of general economic theory." Jacob Mincer, "The Distribution of Labor Incomes: A Survey," Journal of Economic Literature, March 1970, p. 23. David Gordon has summarized this point as well.

> "In emphasis if not in precise substantive hypothesis, the theories seem to suggest that individuals have a nearly

make two critical decisions which determine their own income. Each worker decides how much to invest in the accumulation of human capital stock and how much time to devote to work and how much to leisure. In the investment decision, individuals are constrained by innate ability, a diminishing marginal return to increments in investment, and an inelastic supply of investment funds. In the labor-leisure choice, the ultimate constraint is the number of hours in the day and the physiological need for rest. Within a broad range, individuals determine their own wage rate, the hours of labor they supply, and consequently their own annual and lifetime earnings.

In the general earnings distribution theory developed here, the neoclassical assumptions are abandoned. To the extent that the traditional formulation rests on the concept of free choice or "free will," the present model embraces the opposite philosophical position; it is at root socially deterministic. The observed distribution of earnings is not the product of numerous personal decisions, but rather primarily a function of social class, race, and sex. Ultimately, these are the exogenous determinants of wage rates. In a social

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> unlimited range of opportunities in the course of their lifetimes. This implication seems to play the same role in theories of income as the notion of "consumer sovereignty" plays in theories of consumption and demand. In consumer theory, that is, orthodox economists concentrate on the results of free consumer choice among a given bundle of commodities with different prices, rather than focusing on the ways in which institutions tend to define or limit the bundles available for choice."

David Gordon, Economic Theories of Poverty and Underemployment (National Bureau of Economic Research, 1971), p. 55.

stratification model of earnings, individual choice or "free will" is consigned to the error term, as it were, along with other stochastic variables.

The distribution of earnings is a function of successive stratification in three markets. In the human capital market, race, sex, and social class, or what may be called the "social stratification" factors, play a predominant role in the distribution of personal investment opportunities. In the "external" labor market, race and sex play an essential role in the distribution of individuals across occupations and industries, human capital held constant. Finally, in the "internal" labor market, these same social stratification factors are responsible for part of the variance in earnings within specific occupations and industries, again assuming human capital *ceteris paribus*.

The General Social Stratification Model

A simplified version of the stratification theory can be described in a recursive system of functional equations. Race, sex, and social class are the ultimate exogenous variables which determine the earnings distribution through a series of primary and supplementary transformations on human capital, occupation strata, and industry.

$$\text{(I)} \quad HC_i + F_{HC}(R_i, S_i, C_i, A_i) + \varepsilon_{HC}$$

$$\text{(II)} \quad OS_{ik} = F_{OS}(HC_i, A_i) + f_{OS}(R_i, S_i, C_i) + \varepsilon_{OS}$$

$$\text{(III)} \quad IN_{ij} = F_{IN}(R_i, S_i) + \varepsilon_{IN}$$

$$\text{(IV)} \quad W_i = F_W(OS_{ik}, IN_{ij}) + f_W(HC_i, A_i) + f'_W(R_i, S_i) + \varepsilon_W$$

where: HC = human capital
R = race
S = sex
C = social class
A = "innate ability"
OS = occupation stratum
IN = industry
W = wage rate
i relates to the i^{th} individual
j relates to the j^{th} industry
k relates to the k^{th} occupation
F is a primary function
f is a secondary function
f' is a tiertiary function
ε is a residucal term

Equation (I) indicates the expected maximum quantity of human capital which individual i will be able to acquire.[2] Following Becker, the quantity of human capital demanded is positively correlated with ability.[3] Ceteris paribus, those with greater native ability have higher marginal rates of return (mrr) on any given level of investment and thus have an incentive to invest more than others.

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[2] If the present model is used to evaluate the present value of discounted lifetime earnings, HC would refer to the expected lifetime acquisition of human capital. If the model is used to evaluate wage rates at a given point in time, HC is a measure of the individual's human capital at the time when W is measured. To the extent that individuals have different time paths of capital acquisition, the distribution of earnings at a point in time will diverge from the distribution of lifetime earnings.

[3] See Gary Becker, "Human Capital and the Personal Distribution of Income: An Analytical Approach," W.S. Woytinsky Lecture No. 1, Institute of Public Administration and Department of Economics, University of Michigan, 1967, p. 5.

The available supply of human capital, however, is restricted by racial, sexual, and class discrimination in the capital funds market while the demand for funds is limited by discrimination in the labor market. In the capital market, minorities find the marginal cost of investment funds (mcf) higher than for others. This affects the quantity of personal human capital accumulated as well as its structure. Entry barriers to apprenticeship programs, for example, are equivalent to prohibitively high mcf rates for specific types of investment.

On the demand side, external and internal labor market discrimination diminish the equilibrium marginal rate of return on investment for minorities by lowering future expected earnings. Together, the lower mrr on investment and the higher marginal cost of funds constrain the amount of human capital acquired by minority members of the labor force. Human capital acquisition, according to the stratification theory, is thus a function of innate ability tightly constrained by the onus of race, sex, and social class origin. As suggested earlier, the error term (ε_{HC}) includes the effect of personal preference and the rational response to wage differentials insofar as the individual is not completely constrained by other variables in the function. This equation is less mechanistic than may at first appear. The effect of race, sex, and social class operates through cultural transference as well as through institutional discrimination. Social class, for instance, obviously plays a significant role in determining human capital investment decisions by structuring "personal preference." The same can certainly be said for sex and probably for race. Given this perspective, "individual decision-making" is for the most part socially determined leaving only a small residual which can be thought of as pure individual personal preference. The actual "size" of this residual, of course, is open to considerable debate.[4]

The second equation maintains that the probability of individual i entering occupation stratum k is determined primarily by the individual's stock and structure of human capital and native ability. For present purposes, the concept of "occupation stratum" need not be rigorously defined.[5]

Equation (II) can be thought of as the human capital equation in the overall theory. At this stage, the social stratification factors enter the equation independently, but are of secondary importance. Their primary role is played in the first and third equations; that is, minority members of the labor force are assumed to be screened out of certain occupations not so much because of direct occupational entry barriers, but because of the dynamics represented in Equation (I). The stochastic term (ε_{OS}) accounts in part for personal occupation preference after controlling for human capital and the influence of race, sex, and class.

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[4] For an excellent discussion of how social class, family, and school interact to determine the level of an individual's human capital stock, see Samuel Bowles, "Unequal Education and the Reproduction of the Social Division of Labor," Review of Radical Political Economics, Fall-Winter 1971.

[5] For empirical purposes, an occupation stratum will later be defined as a set of specific census occupations which share similar specific vocational preparation (SVP) and general educational development (GED) requirements as reported by the U.S. Department of Labor, The Dictionary of Occupational Titles (Washington: U.S. Government Printing Office, 1966).

Unlike occupation strata, industry attachment is based on race and sex alone (plus a stochastic factor). This formulation follows from the fact that most industries require a broad range of skills and combine a large number of occupations. For the purpose of the model, the whole spectrum of occupation strata in the economy can be thought of as being replicated in each industry, although the relative number in each occupation stratum varies considerably. The theory maintains that there are racial and sexual barriers which prevent large numbers of minority members from entering certain industries even in occupations which require relatively little human capital or innate ability.

The error term in Equation (III) contains a number of factors beside personal preference. Limits to geographical mobility between labor markets has some effect on constraining "industry choice," given regional differences in industrial structure. Cyclical factors in the aggregate economy also affect the relative availability of positions in different industries. In addition, pure "luck" plays a role in industry attachment; being in the "right" personnel office at the "right" moment may be an important factor in determining an individual's attachment to an industry sector.

Finally in Equation (IV), the personal distribution of earnings is described by the distribution of the labor force into occupation and industry "slots." Knowledge of an individual's occupation stratum and industry attachment is sufficient to define the individual's wage within rather narrow limits. At this point, differences in human capital and ability as well as differences in race and sex may still have an independent effect in terms of further defining individual earnings.

To summarize, stratification plays its primary role in determining the distribution of human capital. (See Figure 3.1) But it continues to play an independent and supplementary role at every stage

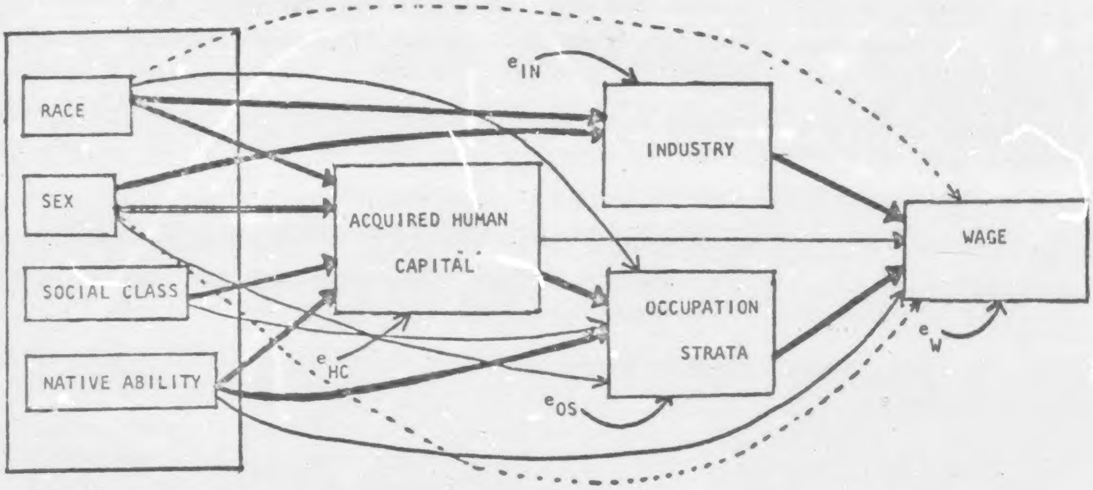
RACE
SEX
SOCIAL CLASS
NATIVE ABILITY
ACQUIRED HUMAN CAPITAL
INDUSTRY
OCCUPATION STRATA
WAGE
e_{IN}
e_{HC}
e_{OS}
e_W

Figure 3.1 A social stratification model of the personal earnings distribution.

in the wage model. Race, sex, and class affect occupational attachment independent of their effect on human capital while race and sex are also key determinants of industry attachment. Finally these same factors, according to the theory, affect the final distribution of wages through pure wage discrimination within specific occupations and specific industries even when human capital and ability are equal among workers.

Like all general theories, the stratification theory cannot explain all of the variance in the earnings distribution. The error term in Equation (IV) must account for a large number of influences which may have only the most tenuous connection to race, sex, and social class. To be a complete theory of wage determination, this framework would have to be expanded in two directions. First, some attempt would be necessary to explain why stratification and discrimination play such a crucial role in the earnings distribution, if empirically they do.[6] And second, some hypothesis would be required about the demand side of the labor market in order to explain what appears to be a continuing disequilibrium in terms of industry "ability to pay."[7] Neither of these massive efforts is undertaken here. Rather a more specific earnings generating function is derived which can test for the size effect of stratification on personal earnings.

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[6] Why labor market discrimination persists in light of its supposed negative effect on efficiency and profits continues to be one of the critical unanswered questions in modern economics. Whether discrimination occurs because of employer and employee "tastes" as in Becker's early analysis, or discrimination is a rational statistical response to labor market information costs as in Arrow's treatment, or whether it occurs because of "capitalist attempts to divide and conquer the labor force" as in some of the radical literature cannot be directly tested here. What can be tested is how powerful stratification is in terms of the earnings distribution. For background material on the debate, see Gary Becker, The Economics of Discrimination (Chicago: University of Chicago Press, 1957); Kenneth Arrow, "Some Models of Racial Discrimination in the Labor Market," RAND Publication RM-6253-RC, February 1971; and David M. Gordon, Richard C. Edwards, and Michael Reich, "Labor Market Segmentation in American Capitalism," mimeo, March 1973.

The Specific Model

The general model provides a framework for analyzing the total effect of capital, labor, and product market imperfections on the distribution of wage income. However, the scope of the present study is limited to an investigation of only one kind of imperfection. Here we are concerned with the extent to which barriers to occupational and industrial access distort the wage distribution among individuals of equal human capital endowments. For the sake of the present inquiry, human capital acquisition is considered exogenously determined. Thus empirical tests will be primarily restricted to Equation (IV). The specific model is derived from the "crowding" hypothesis first explicitly formulated by Edgeworth in 1922 and since rejuvenated by Bergmann.[8]

To begin, assume a world in which there are two industrial (or occupational) sectors and labor is homogeneous in endogenous productivity and inelastic in supply. Furthermore assume that in the simplest case demand conditions are identical in both sectors so that the marginal revenue product curves are the same in Sector A and Sector B. (See Figure 3.2) If there are no barriers to intersector mobility, in equilibrium an equal number of workers will be found in both sectors ($E^*_A = E^*_B$) and the universal market wage will be $w^* = MRP^*$. Each worker is paid his marginal product which reflects his endogenous productivity. If we relax the assumption of identical MRP curves, wages will still be equal assuming a perfectly competitive labor market.

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[7] One tack taken to understand the differential "ability to pay" begins with a theory of uneven development within a dual economy. For more on this subject, see Robert T. Averitt, The Dual Economy (New York: W.W. Norton, 1968) and Barry Bluestone, "Economic Crises and the Law of Uneven Development," Politics and Society, Fall 1972.

[8] See F.Y. Edgeworth, "Equal Pay to Men and Women," Economic Journal, December 1922 and Barbara Bergmann, "The Effect on White Incomes of Discrimination in Employment," ~~Journal of Political Economy~~, March/April 1971.

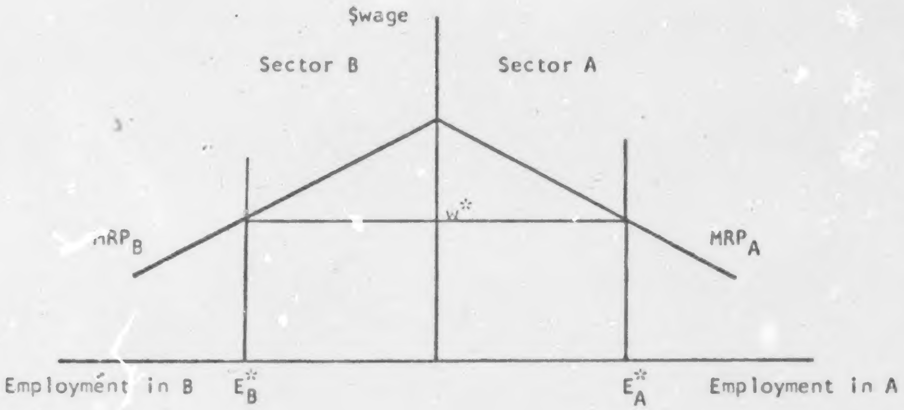

Figure 3.2 No "Crowding"

We can now posit that for some reason firms in Sector A refuse to employ minority workers, restricting their workforces exclusively to white men. All other workers are forced to find employment in Sector B. Assuming that labor force participation does not change after segregation is imposed, the resulting wage and employment relations will be as described in Figure 3.3.

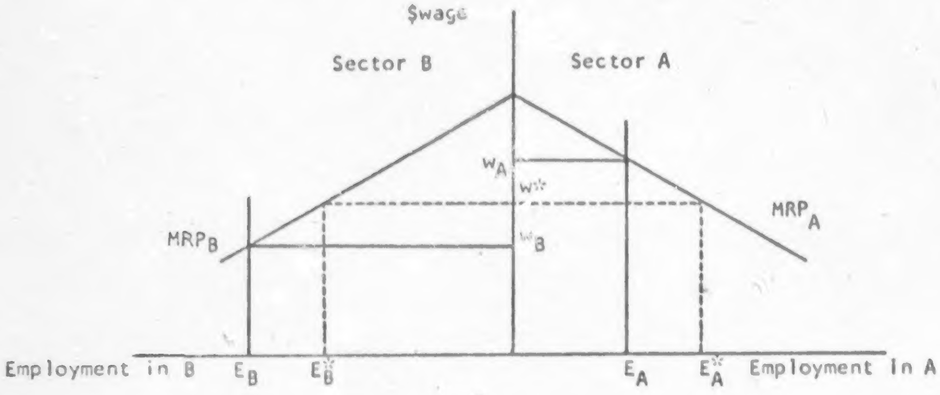

Figure 3.3 Simple "Crowding"

The total labor force $E_A'E_B'$ equals the old level E_AE_B, but the imposed segregated distribution of workers creates a wage differential of $(w_A - w_B)$. Each worker continues to be paid the marginal product in his sector ($w_A = MRP_A$; $w_B = MRP_B$), but now there is no correlation between endogenous productivity and relative earnings. In Sector A, white males are paid a wage greater than their endogenous productivity would warrant ($w_A > MRP^* = ERP^*$) while in Sector B, all minority members are paid a wage below the level that would exist in a non-segregated economy. In this case we can say that minority workers are "crowded" into Sector B, resulting in lower earnings. Imperfect mobility between sectors results in a quasi-equilibrium where wage differentials can persist and where total output is below its full equilibrium level.[9]

Once crowding exists, differences in the labor demand schedules of the two sectors can affect the earnings differential. In Figure 3.4, Sector A is drawn so that the marginal revenue product

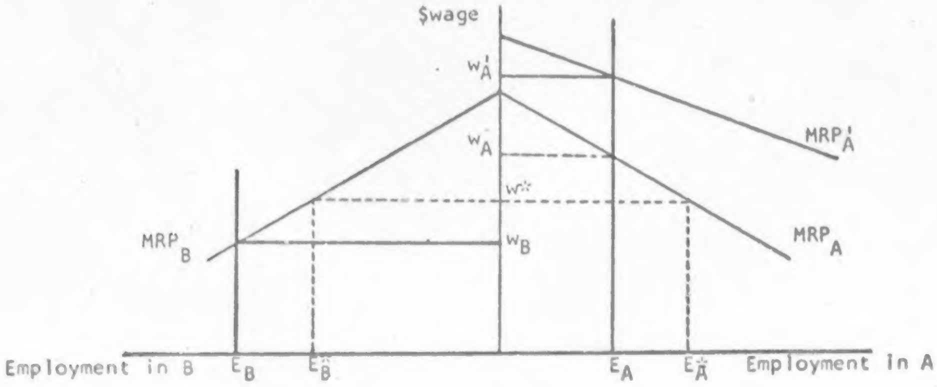

Figure 3.4 Complex "Crowding"

of labor is higher than in Sector B for every equal level of employment. E_AE_B continues to represent the total supply of labor ($=E^*_AE^*_B$), while minorities are limited to employment in Sector B. Under these conditions, the wage differential will be larger. Either because of higher marginal physical product (MPP) or higher marginal revenue (MR) or both, workers who have access to Sector A will benefit.

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[9] Obviously this result requires imperfection in the *product* market as well. If all product markets were perfectly competitive, any employer who paid a wage higher than MRP* to attract a full complement of white male labor would shortly be forced out of the market. At a minimum this model requires some imperfection between *economic* sectors.

If for some reason minority workers were restricted to the sector with a higher marginal product, it is possible that demand conditions could offset the observed effect of simple crowding. We expect that in most cases, however, minorities will be crowded into those sectors where demand conditions are relatively weak, thus adversely affecting their relative wage position. Over time there is a tendency for simple crowding to become "complex." Industries in sector A will tend to substitute capital for labor because wages are high, while industries in B will substitute labor for capital. The present situation in U.S. labor markets may reflect this long-run effect.

There is no problem in generalizing this model to n sectors. Assuming homogeneous human capital, imperfections in the product market, and the existence of crowding, the complete earnings distribution would be described by the set of quasi-equilibrium wage rates established in each sector. Nor is there a need to specify perfect segregation by race, sex, or some other non-endogenous productivity factor for the crowding model to be perfectly serviceable. One of the key hypotheses to be tested, in fact, is that the distribution of earnings is a function of the degree of crowding in each occupation and industry. *Ceteris paribus*, the smaller the proportion of minorities employed in an occupation or industry, the higher the wage.

A Mathematical Treatment

The crowding hypothesis can also be described mathematically. In doing so the parameters that determine wages in the presence of market segmentation can be derived. Assume once again that human capital is homogeneous in a two sector labor market. Furthermore assume that the marginal productivity of labor is a linear function of the number of workers in each sector and is independent of the number of workers employed in the other sector. Finally, assume that employers are unwilling to pay a wage to each worker that exceeds marginal productivity and that workers in a given sector refuse employment which fails to pay them their marginal product. This assures that sectoral wage rates will never be above nor below the marginal revenue product in each respective sector. These last assumptions are only included to simplify the exposition.

The model can be expressed in two linear labor demand equations:

(1) $w_A = a_A - b_A E_A$

(2) $w_B = a_B - b_B E_B$

where $b = dw/dE$

and one employment constraint:

(3) $E_T = E_A + E_B$.

By making alternative assumptions about the intercept term in sector, a_i, the relative slopes of the MRP curves, b_i, and the number of workers employed in each sector, E_i (determined exogenously), measures of the wage differential between the two sectors ($\delta = w_A - w_B$) can be derived.

Four different cases of crowding can be isolated.

(I) No Crowding (with identical demand curves)

Assume $a_A = a_B$

$b_A = b_B$

E_T is mobile between sectors

In this case there are no barriers to intersectoral mobility. Any wage differential between the two sectors will induce some workers to move from the lower wage sector to the higher wage sector until wage rates are equalized throughout the whole economy. In this instance, because the demand curves are identical, employment will be divided equally between the two sectors in equilibrium ($E_A = E_B$) and

$$(4)\quad \delta = w_A - w_B = (a_A - b_A E_A) - (a_B - b_B E_B) = 0$$

(II) Simple Crowding

Assume $a_A = a_B$

$b_A = b_B$

$E_B > E_A$

Here the MRP curves are identical, but minority workers are excluded from Sector A. Therefore,

$$(5)\quad \delta = (a_A - b_A E_A) - (a_B - b_B E_B)$$

$$= b(E_B - E_A)$$

$$= \frac{dw}{dE}(E_B - E_A)$$

In this case the total wage differential is a function of the number of workers confined to each sector. The greater the slope of the identical demand curves, the larger the wage differential given E_A and E_B.

(III) "Complex Crowding" - Type 1

Assume $a_A > a_B$

$b_A = b_B$

$E_B > E_A$

In this case minorities are crowded into Sector B and the demand curve in Sector A is above the schedule in Sector B. At every level of equal employment in both sectors, the marginal revenue product in A is greater than in B. The wage differential, δ, will then reflect both the "supply" effect of segregation and the "demand" effect of the vertically shifted MRP curve.

$$(6)\quad \delta = (a_A - a_B) + b(E_B - E_A)$$

$$= (a_A - a_B) + \left[\frac{dw}{dE}\,(E_B - E_A)\right]$$

In the linear model, the two effects are simply additive although the existence of segregation is a necessary condition for the existence of any "demand" effect.

(IV) "Complex Crowding" - Type 2

Assume $a_B > a_B$

$b_B > b_A$

$E_B > E_A$

In this more general case, the demand curves have different slopes as well as different intercepts. Here MRP_B has a lower intercept and is more inelastic than MRP_A at every level of equal employment in the two sectors.

$$(7)\ \delta = (a_A - a_B) + (b_B E_B - b_A E_A)$$

$$= (a_A - a_B) + \left[\left(\frac{dw}{dE}\right)_B E_B - \left(\frac{dw}{dE}\right)_A E_A\right]$$

This last equation can be expressed in terms of demand elasticities by substituting $(w_i/E_i)/\eta_i$ for the b_i in each equation. Therefore,

$$(8)\ \delta = (a_A - a_B) + \left[\left(\frac{w_B}{E_B}\right)\cdot\left(\frac{1}{\eta_B}\right)E_B\right] - \left[\left(\frac{w_A}{E_A}\right)\cdot\left(\frac{1}{\eta_A}\right)E_A\right]$$

Rearranging the terms in equation (8) yields:

$$(8')\quad w_A\left(1 + \frac{1}{\eta_A}\right) - w_B\left(1 + \frac{1}{\eta_B}\right) = (a_A - a_B).$$

$$(8'') \quad \frac{w_A}{w_B} = \frac{(a_A - a_B)}{w_B(1 + 1/\eta_A)} - \frac{(1 + 1/\eta_B)}{(1 + 1/\eta_A)}$$

Finally, letting w_B be the numeraire ($w_B = 1$), we can derive an expression for the relative wage, w'_A.

$$(9) \quad w'_A = \frac{1 + a_A - a_B + 1/\eta_B}{1 + 1/\eta_A}$$

Thus with employment levels set exogenously, relative wages will be a function of the loci of the respective sectoral demand curves. More specifically, if the intercepts are equal ($a_A = a_B$), expression (8'') reduces to:

$$(10) \quad \frac{w_A}{w_B} = \frac{(1 + 1/\eta_B)}{(1 + 1/\eta_A)}$$

and it is clear that, given intersectoral immobility, relative wages are a function of relative employment levels and the labor demand elasticities in each sector.

One interesting implication of the "complex crowding" model is that in the face of intersectoral immobility, the earnings of minorities may still be equal to or even exceed those of the dominant employment group if the labor demand schedule in the crowded sector is sufficiently above that in the discriminating sector. From equation (7) it is clear that given equal intercepts, the wage differential is reduced to zero when the ratio of the demand slopes is inversely proportional to the ratio of employment in the two sectors. That is, $\delta=0$ when $b_B/b_A = E_A/E_B$ and $a_A = a_B$. More generally, when the intercepts are not equal, $\delta=0$ when:

$$(11) \quad \eta_B = \frac{1}{1/\eta_A + a_B - a_A}$$

This follows from equation (9).

While this may be only of theoretical interest, it implies that if for some reason crowding could not be overcome, wage equalization could still be brought about by manipulation of the derived demand for labor in each sector of the economy. That is, if somehow the demand curve in the crowded sector can be raised above the demand schedule in the discriminating sector, the wage differential can be reduced. Increased demand in the crowded sector can thus compensate for the earnings effect of "oversupply."

The Reduced Form

To measure the composite effect of "crowding" and differentiated labor demand conditions, it is necessary to hold endogenous productivity characteristics constant and investigate the remaining variance in the earnings distribution. This is equivalent to standardizing for human capital and then carefully measuring the composition of the remaining wage differential, δ.

Assuming that endogenous productivity is measured perfectly, a non-zero differential indicates either some degree of crowding or an inequality between wage rates and marginal revenue products, or in all probability, some combination of the two. The portion of the differential due to the relative positions of the employment suppy curves, E_A and E_B, and the MRP schedules can be identified as resulting from industry or occupational crowding. Any remaining differential must then be due to either imperfections in labor market information or to pure wage discrimination within industries and occupations (assuming no measurement or specification error in the human capital and "crowding" variables).

Obviously this course of empirical investigation is fraught with obstacles. Controlling totally for endogenous productivity is an impossibly difficult task. There are a myriad of individual characteristics which enter into the composition of an individual's endogenous productivity. Measuring even a small number of these, independent of the price they exact in the market, requires careful specification. Even then it is difficult to know how much of the remaining variance may be due to unmeasured endogenous productivity traits.[10]

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[10] Is physical height, for instance, an important "endogenous productivity characteristics" for salesmen? If it is and this particular variable is not included in the earnings generating function, we will obviously fail to account for all the variance in salesmen's salaries. Worse yet we may erroneously attribute some of the variance in earnings to another variable which is covariant with height. In this case we run the risk of fostering a mistaken conception about the arguments in the earnings function.

A no less difficult problem arises in identifying the labor supply and demand schedules for each sector of the economy. Measuring the elasticity of demand for labor in a particular industry, let alone in all sectors of the economy, poses some severe methodological problems. The same can be said for measuring the sectoral labor supply curves, even accepting the simplifying assumption of zero elasticity. Finding useful proxies for identifying the loci of the individual supply and demand curves consequently requires some ingenuity.

Still another problem arises in specifying the functional form of the final model. In anything so complex as wage determination, many factors will enter interactively rather than independently. However the relatively simple substitution of log space for even simpler linear space may add very little power to an earnings generating function; the actual interactions between variables may be much more complex than log linear.[11]

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[11] The size distribution of personal income in most Western capitalist nations appears to be lognormal leptokurtic with a Pareto upper tail. Consequently, in order to explain how this distribution occurred, many investigators have attempted to replicate this form through variations in a lognormal function of human capital factors. This research has had mixed results. See, for instance, Lester C. Thurow, Poverty and Discrimination, op. cit. In this work, Thurow fits an equation of the following form:

$$I_{ik} = AEd_i^b Ex_k^c$$

where I_{ik} = income for an individual with i years of education and k years of experience; A = shift coefficient; ED_i = i years of education; Ex_k = k years of experience; and b and c are income elasticities. He concludes that education interacting with years of work experience is an important ingredient in explaining the

For all practical purposes, it is impossible to deal definitively with these problems in an empirical analysis. It is possible, however, to specify some of the most obviously important human capital variables and then, using a number of carefully constructed industry and occupation indices, investigate the extent to which the remaining variance in earnings can be explained by market imperfections. Two stage equations might be used for such an analysis, assuming that an individual's endowment of native ability and his acquisition of human capital temporally precede his entry into a specific occupation and industry. In this case the first equation would specify individual earnings as some function of endogenous productivity characteristics plus a residual term, ε_1. The second equation would attempt to explain ε_1 in terms of industry and occupation variables acting as proxies for measures of labor supply and demand.

Following this procedure and assuming careful measurement of all variables, there would be strong evidence in support of the "pure" human capital theory if the first equation accounted for a large part of the variance in earnings while the second equation failed to explain much of the variation in ε_1. Conversely, if a large portion of the variance in earnings was explained by equation two, this would constitute evidence of significant labor market imperfections. The substance

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distribution of earnings. For a more general theory of complementarities among independent variables in income generating functions, see Martin Bronfenbrenner, Income Distribution Theory (Chicago: Aldine-Atherton, 1971), pp. 50-54.

of these imperfections could only be known if one were to have some confidence in the proxy variables for segregation. If these variables truly measure "oversupply" or differential demand, then significant coefficients in the second equation are a strong indication of "crowding" and the residual in this equation, ϵ_2, measures, at least in part, the earnings effect of imperfections in labor market information and/or "pure" wage discrimination. Thus in a well-specified system of equations it would be possible to measure (1) the effect of differential endogenous productivity on the distribution of earnings; (2) the effect of industry and occupation crowding on wage differentials between individuals; and (3) the residual effect of information imperfections and pure wage discrimination.

No matter the propriety of a two stage analysis for testing the stratification theory, a single equation reduced form has been used in the present research. The regression equations take the familiar form:

$$w_i = \alpha_i + \sum \hat{\beta}_i x_i + \epsilon$$

The use of this equation is warranted by the relative intractability of more complex equation systems and by the prohibitive cost involved in actually fitting large amounts of micro data in multiple stages. This procedure is not unusual in that virtually all previous attempts at measuring the determinants of earnings through large micro samples have also relied on single regression equations.[12,13] For the same reasons of tractability and cost, the basic equation is fundamentally additive.[14]

The right side of the equation is composed of four groups or "modules" of X_i variables. One controls for human capital; another controls for non-monetary effects on relative wages due to working conditions; and the last two are proxies for the loci of the labor supply and demand schedules. The actual regression equations take the linear form:

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[12] See, for instance, Morgan, et al., Income and Welfare in the United States, op. cit.; Weiss, "Concentration and Labor Earnings," op. cit.; Rees and Shultz, Workers and Wages in an Urban Labor Market, op. cit.; Stafford, "Concentration and Labor Earings: A Comment," op. cit.; Johnson and Youmans, "Union Relative Wage Effects by Age and Education," op. cit.; Bennett Harrison, Education, Training, and the Urban Ghetto (Baltimore: John Hopkins Press, 1972); and Wachtel and Betsey, "Employment at Low Wages," op. cit.

[13] Actually, as explained later in the text, a decision rule was followed in fitting the equations such that an approximation to a sequential equations model is obtained. In effect, the human capital variables are held constant (or nearly so) when the industry and occupation variables are added. This is analogous to allowing these latter variables to explain only the residual variance in the earnings function.

[14] In running the regressions, several log linear forms were tried on several sets of data. In each case, the log transform equations did not perform appreciably better than the simpler linear equations, and in a few cases they performed a bit worse. For this reason, and also because the additive model was much easier to interpret and evaluate, the final regressions were run in the additive rather than interactive form. In future research I hope to experiment with several different transformations on the raw data. These may yield somewhat better results if a transform can be found which more approximates the actual underlying interactions between independent variables and the true relation between independent and dependent variables.

$$w_{ijrs} = a + \sum_k b_{jkrs} HC_{ijkrs} + \sum_m b_{jmrs} IND_{ijmrs}$$

$$+ \sum_n b_{jnrs} STRAT_{ijnrs} + \sum_p b_{jprs} WC_{ijprs} + \varepsilon$$

where w_{ijrs} = wage rate for individual i of race r and sex s in occupation stratum j

HC_{ijkrs} = human capital characteristic k for individual i

IND_{ijmrs} = industry characteristic m associated with the industry within which individual i is employed

$STRAT_{ijnrs}$ = a measure n of industry or occupation "crowding" for the industry or occupation within which individual i is employed

WC_{ijprs} = a measure p of working conditions in the specific occupation within which individual i is employed.

ε = an error term

The ability to accurately estimate this set of equations depends on the existence of a suitably large comprehensive micro data set and an adequate specification of each module.

The Data Source and the Set of Regression Variables[15]

The basic data for this study is taken from the 1967 Survey of Economic Opportunity compiled by the Office of Economic Opportunity and the Bureau of the Census.[16] A total of some 61,000 individuals are found in the SEO file, approximately half of which are contained in a self-weighting sample of the United States population. The other half of the sample is drawn from individuals living in predominantly nonwhite census tracts. This oversample provides much better estimates of nonwhite population parameters and consequently it is used along with the blacks in the self-weighting sample to estimate the black male and black female equations.[17,18]

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[15] For an extended description of the data base and how it was compiled see Appendix A.

[16] The Survey of Economic Opportunity is available from the SEO Clearinghouse, Data and Compilation Center, Social Science Building, University of Wisconsin, Madison, Wisconsin 53706. More information about the SEO can be obtained from the Clearinghouse including codebook and user's guide.

[17] Comparisons of the means and standard deviations from the nonwhite segment in the self-weighting sample and the nonwhites in the special oversample indicated no significant differences in terms of all of the variables used in this study. However, there were significant differences between the whites in the self-weighting sample and the whites included in the oversample. For this reason, the oversample population was added only to the black equations. The N's were already of sufficient size in the white equations and the addition of this special sample to the black equations allowed extensive stratification of the black population without loss of statistical significance. The oversample is not used in the race-sex pooled regressions.

[18] Unfortunately, it was necessary to delete nonblack nonwhites from the sample population. The SEO does not contain large enough

From the SEO file, all full-time, full-year workers were selected.[19] This subsample was further refined by the elimination of all those who either did not report a wage rate or reported that their present job was not their "usual job." In addition all workers below age 25 were excluded leaving a sample of predominantly prime age individuals. The total N in the final sample is 13,896.

Data on specific occupation, specific industry, race, sex, hourly wage rate, years of schooling completed, region at age 16, migration from place of residence at age 16, and union membership status were obtained for each individual from the 1967 survey. In addition data on vocational training were available for nearly three-fourths of the sample from the 1966 SEO panel. Where the 1966 and 1967 SEO individuals matched, their training data was merged onto the 1967 tape.

Industry and occupation characteristics available from a number of macro data sources were then merged onto each individual record in the sample. Thus each final record contained not only data on an

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samples of other minorities to permit statistical analysis. At the same time, other minorities have sufficiently different labor market experiences that to include them with blacks would bias the empirical results. For information on different labor market experiences of minority groups, see Larry Sawyers, "The Labor Force Participation of the Urban Poor," Ph.D. dissertation, University of Michigan, 1969.

[19] Full-time, full-year represents all those who (1) reported 30 or more hours of work in the week preceding the interview and (2) reported 40 or more weeks of employment in 1966. This definition is somewhat more lenient than the normal Labor Department definition. It was used in order to take into account those who have normal full-time jobs with some degree of seasonality and those who have full-year jobs where a full work week is somewhat less than a full forty hours, a situation which is becoming more prevalent.

individual's schooling, for instance, but also on such factors as the profit rate and the concentration ratio in the specific three-digit SIC industry in which the individual worked in 1967.

After merging the macro and micro data, the total sample was stratified into occupation groups. Each of the 298 census occupations was matched to the Dictionary of Occupational Titles yielding unweighted average General Educational Development (GED) and average Specific Vocational Preparation (SVP) scores for each occupation.[20] From these scores, seventeen occupation groups were formed which were ordinally ranked according to GED and SVP. Next, in order to create strata with sufficient sample size, groups were added together to form five broad occupational strata. These are the strata used in the final analysis. Each stratum contains occupations with the same narrow GED range and (except for stratum 5) a broader range of SVP scores. The final occupation strata include groups 1-3, 5, 6-9, 12-14, and 15-17. Occupation group 4 was too small to be included in the study. Occupation groups 10 and 11 include "clerical and kindred workers, nec" and "salesmen and sales clerks, nec." Because of the heterogeneous nature of these categories it was necessary to eliminate them from the final analysis.[21]

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[20] For detail on the Dictionary of Occupation Titles and the construction of the GED and SVP scores, see Appendix A.

[21] Some regressions were estimated for occupation groups 10 and 11. Except for a very weak coefficient on years of schooling completed, there were no significant results and the coefficients of determination were always below .05.

In terms of general occupational descriptions, the strata include the following types of workers.

Occupation Stratum	Type of Workers
1-3	Laborers, unskilled workers, menial service personnel
5	Operatives, semi-skilled workers, semi-skilled clerical workers, semi-skilled service personnel
6-9	Skilled operatives, semi-skilled craftsmen
12-14	Mechanics and technicians, skilled craftsmen, skilled service personnel, foremen
15-17	Professionals, high-skilled technicians, managers, officials

This technique of occupational stratification offers a distinct advantage over other methods of categorizing the labor force. Ordinarily, workers are classified into one or two-digit census occupation categories which are differentiated according to job title rather than the presumed requirements of the job. Following this procedure, an operative, for example, is never compared with a given subset of clerical workers or service personnel. Yet for many operatives, the human capital requirements assumed necessary to perform a given job with average proficiency are similar to the requirements established for workers in some clerical or service positions. By dividing the sample on the basis of GED and SVP scores rather than job title, we are able to compare individuals who fill positions having similar educational and vocational requirements but who are employed in different census-defined occupations. This allows the analysis of earnings to be carried out for well-defined segments of the workforce.

The final variable set was chosen from over 180 variables on human capital, industry, and occupation and represent the closest proxies which could be found for each of the modules.[22] In many cases specific variables were chosen in order to make the final results comparable with previous research.

The dependent variable used throughout the analysis is hourly earnings which is computed in the SEO from weekly earnings and weekly hours worked. This variable may be biased by differential overtime rates, but it is still superior to the usual measures of annual earnings. In most cases, the hourly wage should refer to the individual's normal wage because of the "usual" job restriction placed on the sample. Only in the case of abnormal overtime would a problem arise.

The independent variables are divided into four modules. While the modules clearly overlap in some cases, each is an attempt to measure an identifiable force in the earnings generating function.

HUMAN CAPITAL MODULE The seven factors in the human capital module are used to measure the effect of acquired endogenous productivity on individual earnings. In addition, by including these variables in the regression equation, we can hold them constant and investigate the effect of other variables consistent with the stratification hypothesis.

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[22] See Appendix A for a discussion of how the data were developed and a detailed description of each variable.

The seven human capital variables include the following:

Schooling - Formal education is measured by the commonly used variable, years of school completed. This is a continuous variable with the normal expectation of a positive correlation between it and the dependent variable. In the linear additive mode, β can be interpreted as the mean marginal hourly earnings expected from an additional year of schooling.

School-South - To control for the effect of school quality on earnings, an interaction term is used. The school-south variable equals the years of schooling completed multiplied by a dummy variable (=1) if living in the south at age 16. It is expected to be negative. The sum of the $\hat{\beta}$s for the schooling and school-south variables yields the additional earnings from a year of schooling controlled for region. Clearly this is not an optimal quality control measure for a number of reasons, but better measures were not available.[23]

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[23] The inherent problem with the school-south variable is that it may measure the effect of "region" per se rather than the effect of school quality. This is particularly true if there is little interregional migration after age 16. In this case, if the effect of "region" operates through factors unrelated to human capital, the final equation will overestimate the impact of endogenous productivity on earnings. This will, of course, favor the human capital explanation of earnings rather than the stratification hypothesis. Ceteris paribus, the bias in this variable is in favor of the null hypothesis that the industry and stratification variables have no effect on earnings.

Geographical information on state or SMSA, which would have been useful for merging educational resource data onto individual records, was deleted by the Census Bureau from the SEO user tape for reputed reasons of confidentiality.

Training - Current or previous enrollment in an institutional manpower training program is measured by a dummy variable.[24] This variable is intended to measure specific vocational training beyond regular schooling. According to human capital theory, its coefficient should be positive representing a financial return to general training. The coefficient would be zero only if the training was financially provided by the current employer at no expense to the worker.[25]

Migration - Geographical mobility is also measured by a dummy variable which takes on the value of 1 if an individual has not changed residence by more than 50 miles since age 16. Migration is considered an investment in human capital insofar as it raises the marginal product of the migrant.[26] Migration, in this sense, is analogous to investment in schooling or training. Given rational mobility, we expect a negative coefficient on this variable. To the extent that migration is undertaken for non-monetary reasons or is involuntary, it is possible that the coefficient will not be significantly different from zero for some groups.[27]

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[24] Vocational training covered by this variable includes: (1) business college or technical training (2) apprenticeship training (3) full-time company training (4) vocational training in the armed forces (5) other formal vocational training and (6) non-regular general schooling.

[25] For a discussion of the theory behind specific and general training, see Jacob Mincer, "On the Job Training: Costs, Returns, and Some Implications," Journal of Political Economy, Part 2, Supplement: October 1962; and Gary Becker, Human Capital, op. cit. esp. Chapter 2.

[26] For an excellent discussion of the human capital theory of migration, see Samuel Bowles, "Migration as Investment: Empirical Tests of the Human Investment Approach to Geographical Mobility," Review of Economics and Statistics, November 1970.

Experience - No direct measure of labor force experience is available in the SEO. As a substitute, a variable which measures experience as a simple function of age and formal education was created.[28] This assumes that once individuals leave school, they immediately join the workforce and work continuously thereafter. Because of the large variance in the pattern of female labor force participation, this is not a particularly good measure of work experience for women, yet it may be an adequate proxy for men.

Experience, according to human capital theory, is an important factor for it is a form of directly usable specific on-the-job training. The experienced salesman, for example, is more productive because he not only knows his product, but learns through experience the personal quirks of his customers. To account for this effect, a number of previous wage studies have used proxies for experience. Most have found a strong positive correlation between the proxy and earnings.[29]

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[27] If working married women move in response to the employment opportunities of their husbands, migration may not have a salutary effect on their earnings. Thus the coefficient may very well be zero for women. This may be complicated by a racial effect for historically northern migration by blacks has been beneficial, no matter the reasons for mobility. Thus while white women may not benefit from migration, black women (and all men) might.

[28] The variable was created by making "experience" = age - years of schooling completed - 5. This is similar to the construction followed by Thurow and others in creating an "experience" variable for the analysis of earnings functions.

However, the use of "experience" as a human capital variable is questionable. Because of the ambiguous nature of the "experience" variable, little can be said about the meaning of a significant positive coefficient on this factor.[30] Nevertheless we have included the variable in the final regressions and we will normally interpret it as though its main effect is to augment endogenous productivity. This, of course, biases upward the total explanatory power of "human capital" in the earnings generating function. If we were to take the alternative interpretation of the experience variable--that experience or seniority reflects nothing more than institutionalized pay increments based on length of service and set out in collective bargaining agreements or offered by employers to maintain morale--it would rightly be considered as one of the industry factors.

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[29] Thurow has used years in the labor force as a proxy for "experience" or on-the-job training and concludes that a large portion of the difference between white and Negro incomes can be explained by differences in the returns to experience. See, Lester Thurow, "The Occupational Distribution and Returns to Education and Experience for Whites and Negroes," Federal Programs for the Development of Human Resources, Joint Economic Committee (Washington, D.C. 1968), pp. 267-84. Rees and Shultz use "seniority" as a measure of work experience and find it to be the most significant variable in explaining the wages of workers in their Chicago labor market study. See Rees and Shultz, *op. cit*. In other studies, the variable "age" is often used as another proxy for work experience.

[30] The ambiguous nature of this variable was discussed in the section on "Empirical Studies of the Human Capital Earnings Function" in Chapter 2.

Specific Vocational Preparation (SVP) - The final human capital variable measures the amount of on-the-job training time required to gain average proficiency in an individual's census occupation. The actual variable is continuous taking the values of 1.0 through 9.0 reflecting actual training time in months and years. (See Appendix A) It is used directly as a measure of investment in on-the-job training and supplements the measure of institutional training.

Like the "experience" variable, SVP also has an ambiguous meaning. It differs from such variables as schooling, migration, and institutional training in that it does not occur temporally previous to employment in an industry or an occupation. An individual must gain access to a specific job before SVP is acquired. Thus if individuals are barred from entering occupations which require long training periods, the training may in fact contribute to their marginal product, but it should not be considered an unambiguous "human capital" factor. If stratification exists, SVP can be considered an occupation trait such as union affiliation in a union or closed shop.

Unfortunately there is no independent measure of "native ability" in the SEO and consequently the final equations are less than completely specified according to theory. To the extent that native ability is positively correlated with acquired human capital, at least within race and sex groups, the absense of this factor has the effect of biasing upward the coefficients on the specified variables in the module. The purely independent effect of native ability must then be assigned to the error term. A critical problem arises, however, if innate ability is significantly correlated with industry or occupational attachment independent of human capital acquisition. In this case some of the variance assigned to industry and occupational stratification in the regression may in fact be due to differences in ability. While there is no concrete evidence on which to decide this point, it seems reasonable that innate ability probably has some independent effect on earnings within an industry or occupation, but little effect on determining initial employment attachment. The information costs to the employer of acquiring independent measures of the native ability of prospective employees probably precludes the use of such a measure in initial hiring decisions. If this is true, the effect of native ability on earnings will appear in the error term; it will not significantly bias the coefficients on the industry and stratification variables.

STRATIFICATION MODULE For measures of "crowding" or segregation, we rely on factors which affect the relative labor supply locus for each industry and occupation. In the stratification theory, these variables are related to race, sex, and social class. In the traditional institutional theory, relative supply schedules are determined through trade unionism and sometimes by other means (e.g. civil service channels).

For present purposes, measures of relative crowding by race, sex, and union membership status are used. Labor market stratification occurs along other dimensions as well. However measures of social class stratification are not available and we can only speculate about other non-human capital characteristics used to segment the labor force.

Although it is tempting to equate stratification with labor market discrimination, the hypothesis under examination does not rely on this interpretation. Stratification may occur through a socialization process and be related, at least in part, to cultural institutions and tradition. Women, for instance, may tend to stratify themselves into certain types of "women's work." Whether this form of stratification is "voluntary" or not depends on a whole set of subtle psychological and anthropological questions which cannot be easily answered.

Union Member - Trade union membership is measured as a dummy variable for each individual in the sample. Union membership can affect earnings in two ways; in both cases the primary effect is through the labor supply schedule. Often in the skilled crafts, labor supply is directly restricted through apprenticeship programs and work rules which are maintained so as to limit the number of workers in a specific occupation. This also appears to occur in a number of professions. Industrial unionism, on the other hand, has the effect of restricting employment in a given industry through its influence in setting the quasi-reservation price of labor.[31] In either case monopoly rents are created thus making wages positively correlated with union membership, given industry demand schedules and of course assuming that unions are effective in limiting industry employment.[32]

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[31] In the case of craft unionism, one can think of the union as affecting the locus of a perfectly inelastic supply curve of labor, moving it leftward on the horizontal employment axis. In the case of industrial unionism, the union affects the locus of a perfectly elastic supply curve, moving it upward on the vertical wage axis. In

Percent Minority-Industry (% MININD) - Data on minority employment was merged onto the SEO sample from the 1960 U.S. Population Census volume on "Industry Characteristics."[33] The data refer to 105 three-digit industries. The number of white females plus black males and black females was calculated as a percentage of total employment in each industry.

This variable is used as a measure of the relative extent of segregation in each industry. It implicitly assumes that if there were no "crowding" there would be an equal percentage of minority employment in each industry. Industries with relatively few minority employees are considered relatively "uncrowded." The lack of minority representation is assumed to be due to some form of entry barrier which restricts labor supply along racial and sexual lines. The

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setting a "minimum" wage below which no labor will be supplied, the union in effect is setting a reservation price.

[32] In the long run, of course, trade unionism may also affect earnings through the capital-labor ratio. Higher wages in the short run presents an incentive to the employer to increase the capital-intensity of his production process. In doing so, the marginal product of labor is raised, and given labor supply restrictions, this leads to even higher earnings.

[33] U.S. Department of Commerce, United States Census of Population, 1960, "Industry Characteristics," Series PC(2) 7 (Washington, U.S. Government Printing Office, 1966).

percentage of minority employment will then be inversely correlated with earnings, according to theory.

Unfortunately the mere existence of a significant negative coefficient of %MININD, no matter how large, is insufficient to prove the existence of a "crowding" effect. In fact there may not be a definitive proof of crowding at all because of the difficulty in isolating this phenomenon from pure wage discrimination.

Theoretically we can distinguish three cases. Pure discrimination would be the rule if minority workers were paid lower wages in all sectors while percent minority employment (%MININD) was invariant. Alternatively "crowding" would be the best explanation of wage differences if minorities were segregated into some sectors of the economy but both minorities and the dominant group (white men) were paid identical wages whenever both worked in the same sector. Each of these extreme cases is, of course, clear-cut. Unfortunately the case which is more realistic is highly ambiguous as "crowding" and pure wage discrimination probably coexist. It is because of this "colinearity" that the two independent effects cannot be easily identified. The best we can do is to amass as much evidence as possible to draw the distinction knowing full-well that it cannot be proven. The needed evidence can be gathered by carefully specifying the estimating equations. This matter is left to Chapter V.

Percent Minority-Occupation (%MINOCC) - Data on minority occupational representation was merged onto the SEO sample from the 1960 U.S. Population Census volume on "Occupational

Characteristics."[34] The data refer to 298 specific census occupations. The number of white females plus black males and black females was calculated as a percentage of total employment in each occupation. In addition, variables were created for each minority group separately as well as one for all females.

Analagous to the industry measure, this variable is intended to gauge the relative intensity of "crowding" in each occupation. Again it implicitly assumes that if there were no occupational crowding, each occupation would have an equal percentage of minority workers. This variable should be inversely related to earnings, but it has the same problem of interpretation as %MININD.

INDUSTRY MODULE The five variables in the industry module reflect an industry's "ability to pay" higher wages. "Ability" is related to the locus of the labor demand curves in each industry and to the potential size of producer's surplus. In each case, the variables chosen relate to the traditional factors used in institutional analyses of wage differentials.

Concentration (Market Power Factor) (MPF) - The measure of concentration used in this study is a new one developed specifically for merging with the SEO data. Similar to the four-firm or eight-firm concentration ratios normally used as a proxy for measuring oligopoly power, the variable used here is a measure of the share of industry revenues generated by the firms with the largest assets in the industry.[35] The major difference between this "market power factor" and normal concentration ratios is that the former has a variant number of firms in the "largest asset" category. Normally there are between three and five firms, but the range for the 105 industries used in the analysis runs from two to eleven. This is necessitated by the data source used to compute the variable.

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[34] U.S. Department of Commerce, United States Census of Population, 1960, "Occupational Characteristics," Series PC(2) 7A (Washington, U.S. Government Printing Office, 1966).

This does not appear, however, to present a critical problem, particularly since the simple correlation between Weiss's concentration ratios and the MPF's for the manufacturing sector is .89. Whatever is lost in terms of the specification is more than compensated by the fact that the new measure can be calculated for the whole range of industries, not just manufacturing. In this way the full variance in "concentration" can be taken into account in the empirical analysis.

As in most previous studies, a positive relationship between concentration and earnings is expected. This is particularly true where workers are organized in strong unions. Collective bargaining power may allow employees to appropriate a share of oligopoly profits or gain higher wages at the expense of higher consumer prices. Where unions are weak or nonexistent, concentrated industries may pay higher wages anyway in order to forestall union organizing drives or for purposes of employee morale. Firms in highly competitive industries are constrained in their "ability to pay" by market forces.

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[35] See Appendix A for greater detail on the construction of this variable.

Union X Concentration - An interaction term is used to improve the specification of the relationship between unionization (which is in the stratification module), concentration, and earnings. A negative sign is expected on the interaction term. Unionization and concentration each affect the wage rate positively. But for a given level of unionization, the higher the concentration ratio, the lower the wage rate. This follows from a theory of bargaining power and spatial limitations to firm entry. The greater the economic and political power of management, the easier it is for management to withstand union wage demands. Conversely, where labor is unified and firms are relatively weak, but spatial entry barriers provide an appropriate "ability to pay," one expects higher wages. Where strong unions are up against powerful corporations, the ability to extract wage increases may be diminished. The former case is often found in construction and trucking, the latter often in durable manufacturing.[36]

After-Tax Profit Rate - To measure profitability, an historical after-tax profit rate (on total assets) was computed for each industry.

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[36] For more on the theory of concentration and unionism, see Harold M. Levinson, "Unionism, Concentration, and Wage Changes: Toward a Unified Theory," Industrial and Labor Relations Review, January 1967. Weiss was the first to use such an interaction term in regression analysis and found a significant negative sign in some of his equations. See Leonard Weiss, "Concentration and Labor Earnings," op. cit.

The variable is constructed so that it measures an average profit rate for the period 1953-1965. An historical measure is required for while changes in relative wages may be related to current profits, it is only logical that wage levels are related to long-run, rather than short-run, net income.[37]

Capital/Labor Ratio - The capital/labor ratio is measured by the dollar amount of depreciable assets per production worker in 1965. It was calculated by carefully merging data from industry tax records and employment and earnings data. Theoretically, the capital/labor ratio affects the marginal physical productivity schedule in each industry through the production function. Assuming the existence of barriers to labor mobility and wages equal to marginal revenue product in each sector, the higher the capital/labor ratio, *ceteris paribus*, the higher the wage.

Government Demand - Public sector influences on product demand are measured by the percentage of an industry's output purchased by all federal, state, and local government agencies. It was computed from the U.S. Input-Output Matrix for 1958.[38] Given the size of government expenditures and its skewed distribution by industry, it is theoretically possible for government to appreciably affect the demand schedule for each industry. In effect, the marginal revenue schedule may be higher in industries affected by government purchases. Theoretically, a shift in government expenditures from industry A to industry B will then affect relative earnings if labor is relatively immobile.

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[37] There is a potential simultaneity problem raised by this variable for wage costs are one of the determinants of net income (i.e. $\pi = pQ - wL - rK$). To the extent that it exists, however, simultaneity biases the results in the opposite direction from the positive coefficient we expect.

[38] Adapted from the United States Input-Output Matrix-1958. Wassily W. Leontief, "The Structure of the U.S. Economy," Scientific American, April 1965.

There is, in addition, another explanation for a positive coefficient on the government demand variable. The Walsh-Healy Act and other federal and state legislation provide that government agencies purchase only from firms which pay the "prevailing" wage or higher. In doing this, however, the government sector may be responsible for setting higher wages in those industries where it is a major consumer. This too would explain a positive relationship between government demand and earnings indicating that, *ceteris paribus*, government-induced employment in the private sector offers higher wages.

WORKING CONDITIONS MODULE Two variables which measure occupational working conditions were added to the final data set in an attempt to control for non-monetary effects on the wage rate. Both variables were calculated from the *Dictionary of Occupational Titles*. The working conditions scores which were added to the data set represent unweighted averages for the census occupations and were compiled from the specific titles in a manner similar to the calculation of GED and SVP scores. Neither is a particularly powerful measure of working conditions, but represent the best data available at the time of the original analysis.

Physical Demands - The physical demand variable measures the physical strength required to perform a given specific occupation. The measure categorizes occupations from "Sedentary" (=1) to "Very Heavy" (=5) and is represented linearly. If there is, on average, an aversion to jobs which require heavy physical effort, a positive relationship between this variable and earnings would be expected. In the absence of labor market stratification, workers would have to be compensated with higher earnings in order to perform jobs which require extraordinary physical effort.

Negative Work Traits - The mean number of adverse working conditions in a specific census occupation is the other variable in this module. Adverse working conditions refer to extremes of heat and cold, humidity, noise and vibration, and the existence of physical or mental hazards on the job including fumes, odors, toxic conditions, dust, or poor ventilation. The more adverse the conditions of work, *ceteris paribus*, the higher the wage necessary to induce workers into the occupation. The specification of this variable, however, may preclude its usefulness for *one* extremely adverse working condition may require more compensation than several minor ones. Again, the lack of an alternative data source forced reliance on this measure.

OTHER VARIABLES AND DATA The final two variables used in the analysis are dummy measures for race and sex. As we mentioned previously, these variables are used in the cross race-sex equations in order to distinguish between the effects of "crowding" and other forms of racial and sexual discrimination in human capital and labor markets. Care must be taken in interpreting these two variables because of the difference in the underlying earnings generating functions for each race-sex group.

The original data set compiled for this analysis of the stratification theory included virtually hundreds of variables, many of which were slight variations of the factors included in the final set. The final variables were selected on the basis of their performance in a large number of macro regression equations. Together with evidence from previous micro and macro studies of wage determination, it was possible to arrive at a final set of variables which reflected all the prime ingredients of an earnings generating function specified in the general stratification theory. These variables were then used in the micro regression equations which will be presented in Chapter V. But first we must deal with the estimation procedure.

CHAPTER IV

THE ESTIMATION PROCEDURE

Translating the general stratification theory into a particular reduced form is problematic in itself. Moving the one step further to fitting actual regression equations poses a number of new difficulties. Before dealing with the empirical results, a brief discussion of methodology is therefore in order. In this chapter estimation and testing procedures are developed to circumvent possible econometric obstacles. One of these concerns the existence of potential multicollinearity in the exogenous variables. Another is the possibility of specification error.

Potential Multicollinearity

A high degree of multicollinearity is always a potentially serious ailment in econometric analysis.[1] In the present context it

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[1] Farrar and Glauber show clearly why a high degree of multicollinearity poses a serious problem in parameter estimation. In their words:

> "The mathematics, in its brute and tactless way, tells us that explained variance can be allocated completely arbitrarily between linearly dependent members of a completely singular set of variables, and almost arbitrarily between members of an almost singular set. Alternatively, the large variances on regression coefficients produced by multicollinear independent variables indicate, quite properly, the low information content of observed data, and accordingly, the low quality of resulting

could in fact be fatal. Linear dependence in the set of explanatory variables would make it impossible to statistically distinguish between the effect of the human capital variables and the effect of the industry and stratification factors on the earnings distribution. In this case we would be reduced to the very unsatisfactory position of having to resort to pure a priori reasoning in order to distinguish between the effects of the two kinds of variables. Regressing earnings on a nonorthogonal set of independent variables would run the risk of a serious Type I error in which we might reject a true hypothesis about human capital or at least seriously underestimate its impact and seriously overestimate the impact of other factors. For this reason it is incumbent that we test the degree of collinearity in the data set and use an estimation procedure which minimizes the possibility of rejecting valid human capital variables which in theory temporally precede other factors in determining earnings.

Appendix B reproduces the means, standard deviations, and the zero-order correlation matrices (X^tX) for all of the regressions in the analysis.[2] Each matrix has been analyzed for pairwise linear

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parameter estimates. It emphasizes one's inability to distinguish the independent contribution to explained variance of an explanatory variable that exhibits little or no truly independent variation."

Donald E. Farrar and Robert R. Glauber, "Multicollinearity in Regression Analysis: The Problem Revisited," Review of Economics and Statistics, February 1967, p. 93.

[2] We shall use (X^tX) to refer to the zero order correlation matrix following the notation of Farrar and Glauber. (X^tX) is the

dependence according to a standard rule of thumb. In addition, a stricter test for collinearity based on a modification of Fisher's z-transformation was used to check for significant non-zero correlation between paired independent variables.

As an example of the test results for multicollinearity, we can look at a portion of the (X^tX) matrix for white males across all occupation strata. Table 4.1 is representative of virtually all of the zero-order correlation matrices used in this analysis. It is clear that this matrix passes the weak collinearity test specified by Farrar and Glauber.[3] The simple correlations between explanatory variables never exceed an arbitrary r_{ij} = .8 or .9. This is usually sufficient to rule out singularity which would be manifest in a near-zero determinant and the consequent explosion of elements of the inverse matrix $(X^tX)^{-1}$. But this weak test would certainly not rule out the possibility of severe arbitrariness in the coefficients of the explanatory variables or in the size of their standard errors.

The potential impact of multicollinearity on the final regression results therefore makes an even stronger test desirable. Modifying Fisher's z-transformation for the confidence interval of an estimated correlation coefficient fulfills this need. This simple algorithm tests for substantial non-zero correlation.[4] Each pairwise

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cross product matrix normalized (by sample size and standard deviation) to unit length.

[3] *Ibid.*, p. 98.

[4] Using Fisher's z-transformation, the confidence interval (z)

TABLE 4.1

ZERO-ORDER CORRELATION MATRIX--WHITE MALES/ALL OCCUPATION STRATA

	School	School-S	Migration	Experience	SVP	MPF	UNxMPF	Profits	Union	%Min-IND
School	1.000	.069	-.134	-.486	.329	.128	-.145	.082	-.217	-.007
School-S		1.000	-.090	-.074	.032	-.013	-.053	-.061	-.119	.030
Migration			1.000	.063	-.114	-.047	.041	.011	.105	-.037
Experience				1.000	-.121	-.044	.062	.051	.092	.016
SVP					1.000	.116	-.100	.003	-.190	-.026
MPF						1.000	.547	.307	.178	-.157
UNxMPF							1.000	.266	.782	-.162
Profits								1.000	.199	-.133
Union									1.000	-.120
%Min-IND										1.000

$r^{*}_{ij} = .146$

HUMAN CAPITAL MODULE INDUSTRY MODULE STRAT MODULE sample correlation coefficient was tested to see if it was significantly larger than an arbitrarily low .100 at the lower bound in the 95 percent confidence interval.[5] For the (X^tX) matrix presented in

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around a sample correlation coefficient can be calculated as:

$$z = \frac{z_r - z_\rho}{z_r}$$

where σ_{z_r} can be approximated by

$$\sigma_{z_r} = \frac{1}{\sqrt{N - 1}}$$

where z_r is the z-transformation on the sample correlation coefficient

z_ρ is the z-transformation on the population correlation coefficient

z_r is the standard deviation of the sample distribution

For the 95 percent confidence interval around the sample r_{ij},

$$z_\rho = z_r \pm (1.96)\, \sigma_{z_r}$$

To modify this formula for use as a test of significant non-zero correlation, the z-transform for an arbitrarily low correlation, z^*_ρ, is substituted for z_ρ and Fisher's equation is solved for the lower bound.

$$z^*_r = z^*_\rho + (1.96)\, \sigma_{z_r}$$

Using Fisher's transformation table and interpolating, the lower bound r^*_{ij} can be calculated. For a fuller discussion of Fisher's test, see Edward J. Kane, Economic Statistics & Econometrics (New York: Harper & Row, 1968), pp. 246-47.

[5] For the purpose of the present analysis, a true population $\rho_{ij} <$ .100 was considered a strong indication of linear independence in

Table 4.1, a sample correlation coefficient, according to this collinearity test, must exceed .146 for the true population coefficient to exceed .100 at the 95 percent level.

Applying this procedure to the correlation matrix in Table 4.1 indicates that while there are a number of instances where a sample coefficient exceeds .146, only two of these involve a correlation between a human capital variable and a variable in another module. In both of these cases, the relationship is curiously inverse suggesting that in the determination of earnings, membership in a trade union may be a substitute for schooling and on-the-job training rather than itself being a function of human capital.[6] Adding the variable for union membership to an equation which already includes schooling and SVP will then not bias human capital coefficients downward.

The same test for collinearity shows some degree of linear dependence among the variables within the stratification and industry modules. Union membership, concentration, and after-tax profits are

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the explanatory variables. While this figure is purely arbitrary, it was purposefully set at a low level to assure a strong test of orthogonality. As it turns out, most of the correlation coefficients in the (X^tX) matrices used in this analysis would pass this orthogonality test even if the ρ^*_{ij} were set at an even lower level. Beside being a strong test, the modification of Fisher's z-transformation allows a consistent test for multicollinearity throughout the whole analysis. An r^*_{ij} was calculated for each (X^tX) matrix based on a $\rho^*_{ij} = .100$ and the individual pairwise sample correlation coefficients were compared with these values.

[6] This inverse relation is fully consistent with the findings of Johnson and Youmans in their study of the relative effects of unionization, age, and education on earnings. See Johnson and Youmans, op. cit.

positively correlated with each other while percent minority employment is inversely related to all of these. There is also a degree of linear dependence in the human capital module. The amount of collinearity within these modules indicates that it is necessary in some cases to choose subsets of the human capital, industry, and stratification factors to avoid the purely arbitrary assignment of explained variance within modules. In running the actual regressions this was often done. This pattern of linear independence between the human capital variables and the industry and stratification factors and some linear dependence within each module is for the most part repeated in all of the (X^tX) matrices in the analysis. It assures a minimum of bias in our estimates of each module but indicates that caution must be used in interpreting the coefficients on individual variables.

The Estimation Procedure Mechanics

To be even more certain, however, that the small amount of inter-module collinearity does not bias the empirical results, a two step estimation procedure was followed in calculating the regressions. This procedure assures the integrity of the human capital variables. The same procedure was followed in each complete regression.

The first step in the regression analysis involved running earnings equations which only contain the human capital variables. In each case an attempt was made to find a human capital module which maximized the explained variance.[7] The second step in the estimation procedure entailed adding stratification module variables into the regression under the strict proviso that the addition of an explanatory variable must not destroy the "integrity" of the best fit human capital equation. If the addition of a given stratification variable made a human capital factor insignificant or statistically reduced its regression coefficient significantly, the STRAT variable was removed from the equation to assure the integrity of the HC module. After the inclusion of any STRAT variables, the industry and working condition factors were added again under the same human capital provision. In this way the assumed causal priority of the human capital variables is not violated by the effect of possible inter-module collinearity. In every case individual variables enter the model in a causal order suggested by the general earnings theory.

The initial test for module "integrity" stipulated that the addition of a STRAT or IND variable must not be allowed to reduce a previously significant HC variable to statistical insignificance at the .05 level. With a few important exceptions, whenever the addition of a STRAT or IND factor wiped out the significance of one or more human capital variables, the newly added factor was eliminated instead. This process was necessary in instances where there was a significant degree of collinearity as measured by the z-transformation test.

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[7] In actuality the "best fit" human capital equation was deemed to be that one which minimized the standard error of the regression estimate (SEE_{min}).

The initial t-test for coefficient integrity assures the statistical significance of the human capital variables, but it is incapable of checking for an absolute change in the size of the coefficients after STRAT and IND variables are added. Thus a second more rigorous test was performed on the human capital coefficients which entailed applying a standard test statistic for the difference between two means.[8]

$$t' = \frac{(\hat{\beta}_1 - \hat{\beta}_2) - (\beta_1 - \beta_2)}{\sqrt{\sigma_1^2 + \sigma_2^2}}$$

Estimates of t' were computed for each human capital variable when there was any doubt about the size of the regression coefficient in the complete equation. With the exception of three special instances which will be discussed in the next chapter, t' was found to be always well below that necessary to substantiate a significant difference in coefficients at the 95 percent confidence level. In most cases $t < 1$ and rarely did it exceed 1.25.

By utilizing the collinearity tests and the two step estimation procedure, the results from the final single regression equations approach those that would be obtained from the use of a two-stage technique. The strict integrity of the human capital module estimates maintained in this way allows a robust, if not overly-conservative, test of the "crowding" hypothesis.

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[8] From William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart, and Winston, 1963), pp. 314-19.

Problems in Parameter Specification

Controlling for collinearity in the multi-module regression equations assures that the coefficients on the human capital variables are not biased by the addition of industry and stratification factors. But errors in the specification of each variable and the form of the overall equation could result in poor estimates of $\hat{\beta}$. Of particular concern is the specification of the dependent variable and the absence of non-linear terms and complementarities in the exogenous variables.

The Dependent Variable - Becker and Chiswick, as well as others who have studied human capital models, use the natural log of earnings as the dependent variable when investments are measured in time equivalents (e.g. years of schooling, experience, training) rather than dollars.[9] In some empirical research a lower coefficient of determination emerges when earnings rather than the log of earnings is regressed on schooling and experience. Nevertheless, the dependent variable in the present analysis is the simple linear term, hourly earnings. This is consistent with the work of Weiss, Morgan, et al., Hanoch, Rees and Shultz, and Wachtel and Betsey.[10]

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[9] G.S. Becker and B.R. Chiswick, "Education and the Distribution of Earnings," American Economic Review, May 1966.

[10] See Leonard Weiss, "Concentration and Labor Earnings," op. cit.;

Before the final analysis was attempted, a number of preliminary regressions were prepared on individual occupation strata using the natural log of earnings as the dependent variable. In these experiments the log specification did not perform significantly better than a linear specification. Both specifications provided similar coefficients of determination and standard errors of the regression estimate. In a few cases the log equations performed a bit worse than others. For this reason, as well as for ease in evaluating the final results, the non-log specification was retained. While these experiments were not performed on all occupation strata or the cross race-sex equations there does not appear to be any evidence that the dependent variable is less well specified than in comparable studies.

The superiority of the log specification in some research viz-a-viz the adequacy of the normal specification in the present study may be explained by the structure of the respective analyses and the characteristics of the labor force sample in each study. The present analysis is primarily carried out within individual occupation strata rather than across the whole spectrum of occupations in the economy. It is possible therefore that a linear relationship exists between earnings and human capital variables within a specific stratum while the relationship is better represented by a log linear

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Morgan, *et al.*, *Income and Welfare in the United States*, *op. cit.*; Giora Hanoch, "An Economic Analysis of Earnings and Schooling," *op. cit.*; Rees and Shultz, *Workers and Wages in an Urban Labor Market*, *op. cit.*; and Wachtel and Betsey, "Employment at Low Wages," *op. cit.*

form for the economy as a whole. A move from one stratum to the next in this case would yield a larger than linear increase in earnings while increased human capital in any given stratum would yield only a linear increase in wage. The difference in specification efficiency might also be due to the fact that the present study is restricted to full-time, full-year prime age workers who are employed at their "usual" jobs. The relationship between human capital and earnings may be linear for this group while the log linear relationship found in some studies may be a function of differential attachment to the workforce. Differences in education, for instance, may have a larger impact on wages between a part-time worker and a full-time worker than between workers who share a similar attachment to the labor force.

Non-linearities in the Exogenous Variables - A number of authors have used non-linear human capital variables to account for the concave earnings profile normally associated with experience, age, or seniority.[11] Normally this is accomplished by running a linear term and its square additively; evaluation of the first derivative gives the extreme value of the function while the second derivative assures that the extreme value is a maximum. Figure 4.1 indicates how such a function will often appear. If the actual profile looks like AA, it is obvious that a linear regression estimate can do little better

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[11] For example, Johnson and Youmans use age and age^2 in their analysis of union relative wage effects by age and education. Johnson and Youmans, op. cit. Rees and Shultz resort to the natural logarithm of seniority to better fit this factor in an earnings function. Rees and Shultz, op. cit.

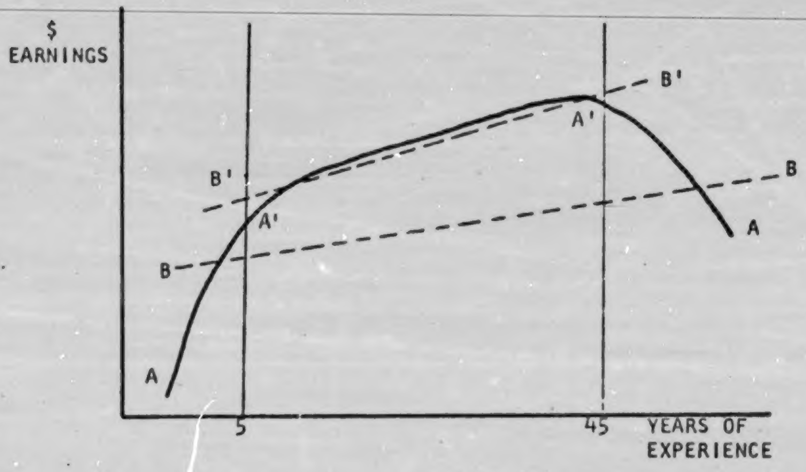

Figure 4.1 The theoretical relationship between earnings and experience

than BB unless a quadratic form is used. Obviously BB is a very poor representation of the true relationship between earnings and experience.

Notwithstanding, no quadratic was used in fitting the final regression equations in the present analysis. Experiments on preliminary equations indicated that the relationship between experience and earnings was generally linear for the population under study. This is not inconsistent with the non-linear profiles of previous research for the present study sample is composed only of those who are in prime age and working full-time full-year. This excludes those under age 25 and for all intents and purposes those who are semi-retired at age 65. Thus we are attempting to fit only the part of the curve labeled A'A'. The regression line B'B' performs this task admirably. The addition of a square or logarithmic term would in this instance fail to explain any more of the variance in earnings.

It is possible that a non-linear term on SVP would have yielded marginally better results given the scaling of this variable. However, if there are significant diminishing returns to longer on-the-job training, as there is for schooling, a non-linear specification may not be superior to the one used in the analysis.[12] In any case, the amount of additional variance that might be explained by using non-linear forms in the human capital module probably does not seriously affect the final results given the sample population. If anything, non-specified non-linearities in the industry and stratification modules may bias the results in favor of the relative strength of the human capital variables viz-a-viz the "crowding" hypothesis.

Complementarities in the Exogenous Variables - A far more serious specification error is conceivably introduced by the absence of interactive relations in the independent variables. The specification used in this analysis implicitly assumes that the effect of each of the explanatory factors is independent of all the others and that their separate effects are strictly additive.[13] For instance, the amount of experience is assumed to have no influence on the returns to schooling and the returns to increasing both schooling and experience are assumed to be equal to the sum of the separate returns to increasing each variable independently.

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[12] The research of Giora Hanoch is responsible for identifying the diminishing returns to schooling for whites and non-whites in the North and South. See Giora Hanoch, "An Economic Analysis of Earnings and Schooling," op. cit.

[13] The one exception to this generalization is the use of an interaction term to specify the relationship between unionization and concentration.

Among others, Thurow believes that complementarities are considerably important in earnings functions.[14] He has argued that

> Returns are not additive but multiplicative. This may be clearly seen in on-the-job experience and education. The returns from experience depend partially on the trainee's level of formal education. Low education levels make some types of training impossible and other types expensive, but as the levels rise, training costs fall and the variety of training which can be given expands. These complementarities also work in the opposite direction. Most jobs require some knowledge which is peculiar to the job and is not or cannot be acquired in school. Education and experience combined yield larger benefits than the sum of the two.

Ignoring complementarities can consequently lead to biased estimates for factors which enter wage determination in combination with others. This is particularly true for equations which cover the whole occupation spectrum. Within a given occupation stratum, however, we are in effect holding training levels roughly constant while observing the returns to education. In this case as Thurow has noted, the regression estimates of returns to schooling and experience are valid within each training level.[15] Insofar as the primary focus in

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[14] Lester Thurow, Poverty and Discrimination, op. cit., p. 71. Also Lester Thurow, "The Occupational Distribution of the Returns to Education and Experience for Whites and Negroes," in Federal Programs for the Development of Human Resources, A Compendium of Papers submitted to the Subcommittee on Economic Progress of the U.S. Joint Economic Committee, 90th. Congress, 2nd. Session (1968) Vol. 1, pp. 267-84.

[15] Ibid.

PAGE 126 OF THIS DOCUMENT WAS MISSING PRIOR TO ITS BEING SUBMITTED TO THE ERIC DOCUMENT REPRODUCTION SERVICE BECAUSE IT WAS UNOBTAINABLE FROM THE SOURCE.

experience and SVP (on-the-job training) cannot be interpreted unambiguously as human capital variables (See Chapter II). To tie them more directly to schooling and institutional training would seriously jeopardize the interpretation of the whole human capital module. Furthermore, an extensive amount of expensive experimentation would be necessary before generating the "correct" form of the interaction terms, particularly given the large number of exogenous variables used in this analysis. For these reasons we have relied for the most part on a simple linear model to test our theory. Further research may improve our estimates, but the marginal gain does not seem to warrant the more than marginal cost of obtaining it.

In conclusion we must use a healthy dose of pure common sense in evaluating the final regressions. Nevertheless we can be confident that the problems of multicollinearity and specification error do not seriously impugn the validity of our findings, especially within specific occupation groups. As it turns out the actual regression results tend to be eminently reasonable as will be shown in the next two chapters.

CHAPTER V

THE REGRESSION RESULTS

Having outlined a coherent theory and generated an appropriate reduced form and a suitable estimation procedure, we are finally in a position to investigate the empirical results. In this chapter each of the final regression equations will be separately analyzed. In the following chapter the regressions will be compared and evaluated so as to identify what portions of existing wage differentials are due to differences in human capital versus differences resulting from occupational and industrial stratification.

Recalling Chapter III, the reduced form to be tested is of the general form:

$$w_{ijrs} = a + \sum_{k} b_{jkrs} HC_{ijkrs} + \sum_{m} b_{jmrs} IND_{ijmrs} + \sum_{n} b_{jnrs} STRAT_{ijnrs} + \sum_{p} b_{jprs} WC_{ijprs} + e$$

where i, k, m, and n refer to the i^{th} individual with the k^{th} human capital trait in the m^{th} industry with n^{th} degree of crowding and j refers to occupation stratum, r to race, and s to sex. Individual equations have been run for each race and sex group for each of the five broad occupation strata. In addition pooled regressions have been estimated for each occupation stratum across race and sex groups and for each race-sex group across all occupation strata. Finally a "grand pooled" regression was computed for the whole workforce similar to regressions often found in the literature. Altogether there are sixty final regressions excluding those where the sample size is too small to permit statistically significant results.

(I) Stratification by occupation group, race, and sex - Regressions stratified by j, r, and s are used to generate a series of distinctive earnings functions for each race-sex group. Each separate regression is generated on individuals whose particular occupations share similar educational (GED) and vocational preparation (SVP) requirements. These equations are especially valuable in exploring the degree to which wage rates vary within jobs which are narrowly defined by human capital requirements but potentially differ in terms of industry characteristics. Accordingly the results can be used to evaluate the impact on personal earnings of differences in industrial and occupational attachment within specific labor market strata. In addition, by stratifying by occupation group it is possible to ascertain whether specific variables in the model affect wage rates differentially as one moves up the occupational hierarchy.

More importantly, in running separate equations for each race-sex group, one can gather some evidence which can be used to isolate the impact of crowding from the effect of pure wage discrimination. A significant negative coefficient of %MININD or %MINOCC would be prima facie evidence of effective "crowding." It would mean, for instance, that black males who gained access to white male dominated industries fared better than their counterparts in crowded sectors. The same would be true for a significant coefficient in the white male equations, the interpretation being that white men who have the misfortune of being "trapped" in minority-impacted industries bear the onus of crowding as well. The absence of a significant coefficient on the STRAT variables in the individual race-sex equations would tend to weigh against the crowding hypothesis. But the case could not be closed on this account alone. Evidence from pooled race-sex equations would not necessarily corroborate this negative finding if the original STRAT variables in the separate race-sex regressions were insignificant only because of a lack of variance in these measures. This, of course, occurs whenever there is perfect or near-perfect labor market segregation (i.e. apartheid).

(II) Stratification by occupation group across race-sex groups - Stratifying by race and sex therefore leads to downward biased estimates of the effect of crowding as the degree of crowding increases beyond some point. In the extreme case all differences in earnings would end up in the constant term or in differences in the coefficients of other regressors and the impact of industry and occupational crowding could not be directly tested. To remedy this potential problem pooled race-sex equations are computed for each occupation group.

Unfortunately this solution tends to do the job too well. If the "crowding" variables are colinear with race and sex--as they obviously are in the case of perfect segregation--then we would now find a potential upward bias in the new coefficients. It is possible, for instance, that earnings differences between race-sex groups are simply the result of "pure" wage discrimination within each industry and occupation. Crowding may then exist, but even in its absence members of minority groups would be paid less.

In the case of perfect segregation it is therefore impossible to determine whether crowding has anything to do with wage determination at all. But where there is incomplete segregation--which is the more usual occurrence--the net impact of crowding can be approximated by running dummy variables for race and sex in the pooled equations. Because of multicollinearity problems mentioned in the last chapter, somewhat arbitrary regression coefficients result, but the final dummied equations at least put a check on the possibility of overestimating the independent effect of industrial and occupational crowding. The true coefficients on the STRAT variables can then be expected to lie between the values given in the pooled regressions with and without the race and sex variables.

(III) Stratification by race and sex across occupation groups - The equations stratified by j are useful for measuring the effect of industry and occupational attachment on differential earnings within narrow GED and SVP ranges. But by their nature these equations will normally underestimate the full impact of human capital on the total distribution of wage rates across the whole occupation spectrum. Increases in schooling, training, and migration are usually undertaken to move from one occupation group to a "higher" one. To ascertain the total human capital effect the regressions must be pooled across the individual occupation strata. This is the third stage in the analysis. Again wage equations are generated for each race-sex group independently in order to account for and measure differences in the structure of wage generating functions.

(IV) The "Grand Pooled" regressions - The final three equations are pooled across j, r, and s and are constructed so as to yield estimates of the full impact of both stratification and human capital throughout the labor force. Race and sex dummies are added in the last equation in an attempt to generate an estimate of the net relative impact of crowding on overall earnings. These final equations must be treated with all due caution because of the estimation procedure used. The absence of interaction terms in the human capital module, the linear form of the dependent variable, and the combining of all race-sex groups in one equation must be taken into account when evaluating these results. Nonetheless these last regressions are of interest particularly when evaluated in light of other findings.

The Regression Results

The regressions presented in this section are the "best fit" equations consistent with the estimation procedure outlined in the preceding discussion. The R^2s for each regression have been adjusted for degrees of freedom and the figures in the parentheses are t-statistics. The 95 percent confidence level has been used throughout to measure statistical significance.[1] The descriptions of each occupation stratum are based on the mean values for the variables in the cross race-sex equations. These can be found in Appendix B. We begin with the lowest skilled stratum and proceed in steps to an analysis of occupation strata having greater GED and SVP requirements.

OCCUPATION STRATUM 1-3

Jobs in the least skilled occupation stratum require no more than a short demonstration period for the typical worker to achieve average proficiency.[2] The average worker in this group has less than nine years of schooling and only 8 percent have any institutional training. Yet labor force experience averages over thirty years. In 1967 a disproportionately large percent of this stratum's workforce was black (27%) while a full third (33%) were women.

Half of the workforce are members of trade unions and are employed in industries which have on average 36 percent minority employment. Within specific occupations the percentage of minority employment is even larger--43.9 percent, approximately half of whom are white women. On average each production worker in this sample had about $20,000 worth of depreciable assets with which to work, somewhat less than the amount in other strata. Table 5.1 contains all of the regression results for this group.

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[1] Throughout the analysis there are only a few instances where a coefficient is presented which does not meet or exceed the .05 level of significance. These are denoted by an asterisk (*). In most of these the coefficient is significant at better than the .10 level and the variable reduces the standard error of the regression estimate. In the remaining cases the coefficient is reported for comparative purposes.

[2] This figure is based on interpolation of the SVP scale.

White Males - For white men the "best fit" human capital equation contains only schooling and the interaction term school-south as significant variables. Together the two explain 14 percent of the variance in earnings which average $2.71 an hour. An additional year of schooling is valued at 7.8 cents per hour if taken in the non-south. A year of education in the south, however, adds only one cent to the wage rate.

The addition of the significant non-human capital variables increases the corrected coefficient of determination ($\bar{R}^2$) to .315 and reduces the standard error of the estimate (SEE) to less than $.74 without significantly altering the coefficients in the human capital module. Trade union membership adds $.32 to the wage rate which represents a differential of approximately 13 percent over the wage of non-union workers in this stratum. Industry segregation of the labor force also affects earnings substantially. Ceteris paribus, those who become "trapped" in an industry with minority employment 1σ greater than "average" earn $.68 less (2 X .1633 X -2.0851) than workers in industries with minority employment one standard deviation below the average.[3] (Standard deviations are reported in Appendix B.) This

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[3] For consistency throughout the analysis the net effect of

TABLE 5.1

REGRESSION EQUATIONS:
OCCUPATION STRATUM 1-3 BY RACE AND SEX

	White Male		Black Male		White Female		Black Female		Cross Race-Sex	
Constant	2.1321	3.3632	2.1695	1.7986	.9708	2.0723	1.0822	1.8098	1.9190	3.2099
HUMAN CAPITAL MODULE										
Schooling	.0779	.0618	.0779	.0601	.0853	.0491	.0669	.0469	.0702	.0485
	(3.17)	(2.74)	(4.72)	(4.39)	(4.01)	(2.65)	(4.63)	(3.47)	(4.13)	(3.62)
School-South	-.0662	-.0559	-.0823	-.0562	---	---	-.0314	-.0157*	-.0656	-.0453
	(3.56)	(3.28)	(6.27)	(5.20)	---	---	(3.26)	(1.73)	(5.70)	(4.98)
Training	---	---	.4266	.3450	---	---	---	---	.3926	.3341
	---	---	(2.54)	(2.56)	---	---	---	---	(2.09)	(2.28)
Migration	---	---	-.3436	-.2686	---	---	-.2306	-.2734	-.2011	-.2248
	---	---	(3.54)	(3.37)	---	---	(2.78)	(3.64)	(2.03)	(2.92)
Experience	---	---	---	---	---	---	---	---	---	---
Specific Voc. Prep.	---	---	---	---	---	---	---	---	---	---
STRATIFICATION MODULE										
Union Member	---	.3204	---	.4023	---	.2068	---	.2756	---	.3769
	---	(2.45)	---	(4.56)	---	(2.07)	---	(3.57)	---	(4.62)
% Minority--Industry	---	-2.0851	---	-.7213	---	-.8593	---	-1.4104	---	-1.1829
	---	(4.85)	---	(2.86)	---	(2.97)	---	(4.21)	---	(4.03)
% Minority--Occupation	---	---	---	---	---	-.4550	---	---	---	-1.1527
	---	---	---	---	---	(2.09)	---	---	---	(5.28)
% Black Male--Occupation	---	---	---	---	---	---	---	---	---	---
% White Female--Occupation	---	---	---	---	---	---	---	---	---	---
% Black Female--Occupation	---	---	---	---	---	---	---	---	---	---
INDUSTRY MODULE										
Concentration	---	---	---	.9213	---	---	---	---	---	.3992
	---	---	---	(5.57)	---	---	---	---	---	(2.36)
Union x Conc.	---	---	---	---	---	---	---	---	---	---
After-tax Profit	---	---	---	---	---	---	---	5.0373	---	---
	---	---	---	---	---	---	---	(2.36)	---	---
Capital/Labor Ratio	---	---	---	---	---	---	---	---	---	---
Government Demand	---	---	---	1.1146	---	---	---	---	---	---
	---	---	---	(2.11)	---	---	---	---	---	---
WORKING CONDITIONS MODULE										
Physical Demands	---	-.2012	---	---	---	---	---	---	---	-.1687
	---	(1.96)	---	---	---	---	---	---	---	(2.48)
Negative Work Traits	---	---	---	---	---	-.1324*	---	---	---	---
	---	---	---	---	---	(1.90)	---	---	---	---
R^2	.142	.315	.200	.494	.204	.511	.220	.402	.187	.521
SEE	.8174	.7386	.7527	.6034	.4337	.3511	.4475	.3962	.8091	.6269
MEAN	$2.71	$2.71	$2.17	$2.17	$1.74	$1.74	$1.36	$1.36	$2.27	$2.27
N	138	138	253	253	65	65	137	137	277	277

is the first evidence of industry "crowding" affecting the distribution of earnings; it will appear many times again. We might add that this result is clearly in opposition to theories of discrimination which posit that whites must be paid premium wages to work in industries where they are forced to associate with a large number of minority group members.[4]

After the stratification variables are included in the regression, the industry variables fail to explain any additional variance in earnings. This is consistent with the "simple crowding" hypothesis where the locus of the demand curve is uniform across industries but imperfections exist in the labor supply function. Since we are dealing with white males in this instance, neither race nor sex is directly

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continuous stratification and industry variables is measured over the range ± one standard deviation ($\pm 1\sigma$) about the means. (We will refer to this measure as a "one sigma" evaluation.) This measure is used rather than the traditional elasticity concept because it yields a more intuitive sense of a variable's impact on earnings. The $\pm 1\sigma$ evaluation indicates the range in hourly wages earned by homogeneous workers in industries which differ by $\pm 1\sigma$ standard deviation in concentration, profitability, "crowding," etc. By using this type of measure we are neither focusing on the extreme tails of the distribution nor the infinitesimal marginal effect indicated by elasticities. The overall impact of the stratification and industry variables will often be of larger magnitude than this, but seldom smaller. For a normal distribution, two-thirds of all observations lie within 1σ of the mean; for many other distributions including the "pyramidal," the uniform, and the bi-modal, a larger percentage of observations lie beyond 1σ making our measure somewhat conservative. See Daniel Suits, Statistics: An Introduction to Quantitative Economic Research (Chicago: Rand McNally, 1963), pp. 48-51.

[4] For a statement of this position see Gary Becker, The Economics of Discrimination (Chicago: University of Chicago Press, 1957) or Kenneth Arrow, "Some Models of Racial Discrimination in the Labor Market," RAND Publication RM-6253-RC, February 1971.

responsible for the barriers to interindustry mobility required for a significant STRAT factor. Other factors not specified in the equation, but probably including imperfections in labor market information, must account for the industry distribution of white men in this group. It is also conceivable that "lock-in" effects of seniority and geographical immobility generate part of the wage differential.

In the complete equation, the physical demands variable is significant as well. But its coefficient is negative signifying that the remuneration for heavier work is lower than for jobs requiring less physical exertion. This inverse relationship is maintained even after controlling for occupation stratum (GED and SVP), education, union membership, and the race-sex composition of each industry. If this relationship is a valid indication of the true association between physical demands and earned income, then workers either prefer heavier work even at the sacrifice of earnings or some workers become "trapped" in very low wage laboring jobs and cannot easily escape to other occupations in this or other strata. Unless we accept the implausible first implication, this result calls into question the validity of the "compensatory wage" theory--at least for low-skill work groups. As it happens, the physical demands variable is seldom significant in the overall analysis and never in the more skilled occupation strata. The seemingly counterintuitive conclusion implied by this regression may be due to measurement error, as we noted in a previous chapter.

Black Males - Within occupation stratum 1-3, schooling has an *identical* impact on earnings for both black and white men. Although the former average almost 1.4 years less schooling than their white counterparts, an additional year of education for either is worth the same, 7.8 cents per hour. Only in this stratum and in stratum 6-9 is there *no* significant difference between coefficients on schooling for these two groups. In all of the other occupation strata the partial on schooling is statistically greater for whites.

The equality in dollar returns to education within OCC STRAT 1-3 would indicate a benign condition if it were not for the fact that internal rate of return calculations show that extra schooling is not particularly beneficial for either white *or* black men as long as they remain in this stratum. For white men the internal rate of return based on foregone income opportunity is only 1.5 percent while that for black men is only a little better than 2 percent given lower opportunity costs.[5] Additional schooling is obviously not the path to

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[5] The internal rate of return calculations in this analysis are made according to the usual formula:

$$C = \sum_{t=0}^{n} \frac{E_t}{(1 + r)^t}$$

where C represents the opportunity cost of an added year of schooling in terms of foregone earnings, E_t represents the additional earnings in period t due to the added year of schooling and r equals the internal rate of return. In these calculations the opportunity cost, C, was set equal to the annual income earned by an average individual in the occupation strata with mean years of education.

much higher lifetime incomes at least for those "trapped" within this stratum.[6] As is, the difference in schooling completed can explain only 20 percent of the difference in mean earnings between the two groups based on the black male equation evaluated at the mean value of schooling completed by white men.

As in the case of white men, southern schooling adds little (in this case, nothing) to the wage rate of black men. But unlike the results for the white group, both institutional training and migration have a large impact on earnings. Training adds \$.43 to hourly earnings while the failure to emigrate reduces the wage by over \$.34 an hour. Training apparently permits the black worker to move out of the laborer occupations (laborers, n.e.c. and farm laborers) into higher paid jobs in this stratum such as warehousemen, metal filers, textile knitters and loopers, and unskilled painters. Migration represents mobility to the higher wage labor markets of the north.

The addition of the STRAT and IND modules increases the $\bar{R}^2$ to almost .50. Union membership adds over \$.40 to the wage rate; thus the average union member in this stratum earns more than a fifth

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The annual additional earnings from an added year of schooling is assumed to be uniform from the time the individual leaves school until he retires at age 65. In this case education is considered a pure investment good and the marginal earnings profile is assumed flat. For white men in this example, C=\$5920; E_t=\$156; and t=49. For black men, the opportunity cost is only \$4720.

[6] This conclusion is fully consistent with other findings including those of Bennett Harrison, Education, Training, and the Urban Ghetto (Baltimore: The John Hopkins University Press, 1972) and Wachtel and Betsey, op. cit.

(20.3%) more than the unaffiliated worker. In percentage as well as in dollar terms, union membership is more helpful for the black worker than the white. Stratification by industry also affects wages significantly, although it is not as important a factor for black men. A $\pm 1\sigma$ difference in minority employment (%MININD) is responsible for a \$.24 difference in earnings.

The concentration ratio or "market power factor" also affects earnings suggesting the existence of "complex crowding." A forty point difference in the MPF (e.g. .20 vs. .60) is related to a \$.36 difference in earnings. In addition, the government demand variable is significant. *Ceteris paribus*, a $\pm 1\sigma$ difference in government purchases means a \$.16 wage differential. Apparently blacks do a little better in industries subsidized by government contracts.

White Females - Schooling is the only significant human capital variable in the white female equation; it yields approximately the same wage increment as was found in the equations for white and black men. This one factor is responsible for explaining about a fifth of the variance in earnings.

The addition of the STRAT module increase the $\bar{R}^2$ to .511 and reduces the SEE by almost twenty percent. Union membership and minority employment by industry and occupation all affect white female earnings after controlling for education. Union membership is valued at \$.21 an hour yielding a percentage wage differential between union and non-union workers approximately equal to that for white men. The $\pm 1\sigma$ evaluation of percent minority employment in the industry (%MININD) and the percent minority in the occupation (%MINOCC) yield $.30 and $.20 differentials respectively. Taken together these three variables disclose a considerable degree of simple "crowding." If purely additive, the three STRAT variables suggest a potential $.71 wage differential around a mean wage of only $1.74. As in the case of white men, the industry module variables add nothing further to the explanation of earnings for this segment of the labor force.

The nearly significant negative coefficient on "negative work traits" can probably best be explained in terms of measurement error. This is the only instance in which the coefficient is negative. In a few cases the expected positive sign is found; in all others, with this exception, the variable is insignificant.

Black Females - Once more the human capital module explains about twenty percent of the variance in earnings. Schooling has about the same dollar impact on the wage rate as it does for the other groups in the occupation stratum. However, because of the extremely low mean wage rate in this instance ($1.36), the rate of return on additional schooling is greater than for any other race-sex group. In this case, $r > 4.25\%$. Training has no apparent impact on earnings although the percentage of black females in this OCC STRATUM with training (7.3%) is only slightly less than that for black men (9.5%). The other significant variable in the module is migration. Remaining in the same location after age 16 reduces the average wage by $.27 an hour, similar to the effect seen for black men. In this stratum, migration is an important human capital variable for blacks but not for whites, most likely signifying the greater importance of emigration from the south for nonwhite members of the labor force.

Both the stratification and industry modules add to the explained variance in earnings boosting the $\bar{R}^2$ to .402 and reducing the SEE to less than \$.40. Union membership is worth \$.28 an hour, somewhat less than that for both groups of men but somewhat larger than the impact of membership on the earnings of white women. Given the low average wage rate for non-union black women in this stratum, unionization increases the average wage almost 22 percent. This is approximately the same amount as for black men. The $\pm 1\sigma$ evaluation of %MININD results in a wage differential of \$.30 an hour, identical to the impact of industry segregation on white women and only slightly more than the impact on black men. In addition, a $\pm 1\sigma$ difference in after tax profit rates is valued at \$.18 an hour, an indication that differences in industry demand also affects individual earnings.

For all four race-sex groups then, the stratification variables are significant in this occupation stratum and have coefficients of substantial magnitude after controlling for human capital. We take this to be evidence of significant "crowding." Further analysis will be postponed to Chapter VI.

Cross Race-Sex - Without resorting to Chow tests, it is evident that there are some essential differences in the earnings generating functions for the four individual race-sex groups in OCC STRATUM 1-3. While the same key variables are significant (schooling, union membership, and %MININD), there are two important differences in the regressions. In the first place migration plays a prominent role in the functions for both black groups, but has no apparent impact on the earnings of whites. The second difference relates to the influence of the industry module; these variables are also significant for the black equations, but not for the white. Differences in industry structure apparently have no systematic effect on wage differentials within each of the two white groups after controlling for supply side stratification. On the other hand, the wage differentials for both black groups reflect "complex crowding." Put somewhat differently, differences in both supply and demand conditions influence the earnings distribution for blacks while differences in labor supply conditions alone appear to account for the explained wage differentials of similarly qualified white workers.

This structural difference in the earnings functions appears to be related to the relative variation in the underlying distribution of industry characteristics. The significant coefficient on the government demand variable in the black equation may be due to the fact that the dispersion in this factor is much greater for blacks than any other race-sex group. The coefficient of variation for black men is 2.2866 while for white men only 1.6779. The same can be said for the significant coefficient on after-tax profits for black women. Here the coefficient of variation is .713 while it is no higher than .495 for any other group. Still again this holds for concentration in the cross race-sex equation. The absence of significant coefficients on the industry characteristics in the white equations thus may be due to the fact that white workers are found in relatively homogeneous industries while some blacks gain access to "permissive" economic environments and others do not. Those who do enter the more concentrated, more profitable industries earn somewhat more than their apparently misfortunate counterparts.

Although the cross race-sex equations mask these differences in the structure of the earnings functions, they nevertheless contribute to an understanding of wage determination by their ability to estimate the impact of crowding even where segregation is near perfect.

On average across race-sex groups, schooling taken outside the south contributes about \$.07 to the wage rate per year of education, although southern schooling is apparently worth less than one cent. Vocational training adds \$.39 to earnings while those who never migrate from their place of residence at age 16 earn \$.20 less per hour. Altogether the human capital variables can explain only 19 percent of the variance in this stratum.

The addition of the remaining modules boosts the $\bar{R}^2$ to .52. The \$.38 wage increment due to union affiliation is equivalent to an 18 percent differential between union and non-union workers, a figure closely in correspondence with the early institutional results of Levinson and similar to the more recent figures given by Lewis and Stafford.[7] At least for this occupation stratum, the early institutional results based on industry data were not badly biased by the exclusion of human capital variables.

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[7] Levinson reported 14-18 percent in his early calculations; Stafford 10-16 percent; Lewis 10-14 percent. See Harold Levinson, "Unionism, Wage Trends, and Income Distribution, 1914-1947," Michigan

Both %MININD and %MINOCC are significant as well, together contributing substantially to wage differentials. The ±1σ evaluations are worth \$.44 and \$.58 per hour respectively. If union membership and the two minority employment variables are strictly additive, market restriction induced crowding accounts for a measured wage interval of \$1.40 around a mean wage of \$2.27. Differences in the concentration ratio add another \$.21 to the total measured wage differential. But how much of this is due to crowding and how much to "pure" discrimination?

Equation (I) is the pooled regression with race and sex variables added.

(I)

$$
\begin{aligned}
w = 3.1451 &+ \underset{(3.45)}{.0452}\ \text{Schooling} - \underset{(4.15)}{.0378}\ \text{School-South} + \underset{(2.37)}{.3375}\ \text{Training} \\
&- \underset{(2.77)}{.2061}\ \text{Migration} + \underset{(4.62)}{.3664}\ \text{Union Member} - \underset{(3.51)}{1.0019}\ \%\text{MININD} \\
&- \underset{(3.27)}{.7489}\ \%\text{MINOCC} + \underset{(2.38)}{.3887}\ \text{Concentration} - \underset{(2.41)}{.1687}\ \text{Physical Demands} \\
&- \underset{(2.74)}{.2439}\ \text{Black}_D - \underset{(3.86)}{.3958}\ \text{Female}_D \qquad R^2 = [illegible]8 \qquad \text{SEE} = .6042
\end{aligned}
$$

Business Studies, Vol. X, No. 1 (Ann Arbor: Bureau of Business Research, Graduate School of Business, University of Michigan, 1951); Frank Stafford, *op. cit.*, and H. Gregg Lewis, *Unionism and Relative Wages in the United States* (Chicago: University of Chicago Press, 1963).

The coefficients on %MININD and %MINOCC both decline after adding the race and sex dummies, but the fall is not especially precipitous. The largest decline is from -1.1527 to -.7489 for the coefficient on %MINOCC, but even this reduction is not particularly significant. The t-statistic for a difference in the two coefficients using the test of means is only 1.27, well below the level necessary for a clear indication of statistical difference.

TABLE 5.2

REGRESSION COEFFICIENTS ON THE STRATIFICATION VARIABLES IN THE POOLED OCC STRATUM 1-3 REGRESSIONS

	UNION	%MININD	%MINOCC
Without R,S Dummies	.3769	-1.1829	-1.1527
(t values)	(4.62)	(4.03)	(5.28)
With R,S Dummies	.3664	-1.0019	- .7489
(t values)	(4.62)	(3.51)	(3.27)
Reduction due to R,S Dummies	.0105	.1810	.4038
	2.8%	15.3%	35.0%

Union membership, %MININD, and %MINOCC are obviously not mere proxies for race and sex, nor is the market power factor. Even after the race and sex dummies are added, the total measured wage interval for the stratification module is $1.12, eighty percent of its previous value.

Together with the evidence from the individual race-sex equations, the pooled regressions demonstrate that crowding, at least within this one occupation stratum, is a conspicuous factor in determining the distribution of earned income. In addition to "pure" wage discrimination, industry crowding seems to perform an essential function in determining wage rates for each race-sex group, including that of white men. Occupational segregation is also an important factor particularly for white women. Finally unionization plays a substantial role in the wage determination process, a finding consistent with institutional analysis. Beyond these restrictions on the supply side, the market power factor is significant suggesting that demand side characteristics affect earnings, again in perfect accord with traditional institutional theory.

OCCUPATION STRATUM 5

Occupation stratum 5 is composed mainly of semi-skilled manual workers. Almost two-thirds of the white men in this stratum are found in jobs under the single occupation title, "operatives and kindred workers, n.e.c." Similarly 55 percent of the black men are found in this occupation group with another 22.4 percent being janitors and sextons. White women are less concentrated in the operatives category; 38.8 percent are found here while another 14 percent are clerk typists, 12.7 percent are manufacturing checkers and examiners, and 11.5 percent are assemblers. For black women, 45.4 percent are operatives. With the exception of typists, OCC

STRATUM 5 is the traditional semi-skilled blue-collar workforce.

The average full-time worker requires between one and three months of specific vocational preparation to perform his or her job adequately. ($\overline{SVP}$=2.9) The typical worker had a little more than nine and a half years of formal schooling and almost 11 percent have participated in some form of institutional training program. Average experience in the labor force is thirty years. Eleven percent of this occupation stratum is black while 39 percent is female.

The industries in which these individuals work appear in the aggregate statistics to be similar to those in which workers in OCC STRATUM 1-3 are employed. A little more than half of the workforce in stratum 5 are union members while the average minority employment in these industries was 35 percent. Each worker has slightly more capital to work with: $24,000 vs. $20,000 in depreciable assets/ production worker in stratum 1-3. The historical average after-tax profit rate is about .8 percentage points higher.

White Males - The average wage rate for white males in this group is $2.87, 16 cents higher than in occupation stratum 1-3. The "best fit" human capital equation explains 16 percent of the variance in earnings with schooling, school-south, and migration each contributing to the regression. An additional year of school is valued at $.12 per hour except in the south where it returns two cents less. Migration is worth $.18 an hour, migrants earning some 6.6 percent more than those who have not moved since age 16.

The addition of the STRAT and Industry modules increase the $\bar{R}^2$ to .234. Unlike its positive effect on the other groups of workers in this stratum, union membership does not appear to affect white male earnings. Ceteris paribus, the two-fifths of white males in this stratum who are not members of a trade union earn the same amount as the 60 percent who are. Industry segregation, however, does have some effect on relative earnings. The $\pm 1\sigma$ evaluation of %MININD is valued at 23 cents an hour. This is far less than in OCC STRATUM 1-3, but nevertheless still substantial. Concentration is the only significant industry variable; after its addition to the equation no other industry variables are significant at the .05 level. A similar $\pm 1\sigma$ evaluation of concentration suggests a \$.38 wage differential.

The positive coefficient on concentration in the face of an insignificant union membership variable cannot be easily explained. One possibility is that union membership is sufficiently colinear with either concentration or %MININD that its real significance is not registered in the regression.[8] This hypothesis, however, is belied by the fact that after the introduction of the human capital module, the addition of union membership alone still does not yield a coefficient which is significant at the .05 level. An alternative explanation relies on the theory that relative wages are not correlated with unionization because of the "spillover" effects or "sympathetic"

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[8] The zero order correlation between union membership and concentration is .229; between membership and percent minority employment in an industry (%MININD), -.244.

TABLE 5.3

REGRESSION EQUATIONS:
OCCUPATION STRATUM 5 BY RACE AND SEX

	White Male		Black Male		White Female		Black Female		Cross Race-Sex	
Constant	1.8370	1.9263	2.1246	1.6893	1.3942	.7647	.0355	1.2803	1.8284	2.4466
HUMAN CAPITAL MODULE										
Schooling	.1221	.1033	.0733	.0478	.0678	.0484	.1362	.0982	.0816	.0600
	(8.54)	(7.38)	(5.39)	(4.47)	(3.70)	(2.97)	(5.51)	(4.31)	(6.86)	(5.61)
School-South	-.0252	-.0254	-.0418	-.0242	-.0215	-.0149*	---	---	-.0316	-.0251
	(2.72)	(2.85)	(3.94)	(2.92)	(2.39)	(1.87)	---	---	(4.65)	(4.18)
Training	---	---	---	---	---	---	---	---	.3058	.3118
	---	---	---	---	---	---	---	---	(3.05)	(3.58)
Migration	-.1827	-.1540	-.3016	-.2120	---	---	---	---	-.1664	-.1349
	(2.32)	(2.05)	(3.24)	(2.91)	---	---	---	---	(2.73)	(2.54)
Experience	---	---	---	---	---	---	.0177	.0121	---	---
	---	---	---	---	---	---	(3.21)	(2.42)	---	---
Specific Voc. Prep.	---	---	---	---	---	---	---	---	---	---
STRATIFICATION MODULE										
Union Member	---	---	---	.6240	---	.2525	---	.2720	---	.2625
	---	---	---	(8.16)	---	(3.36)	---	(2.88)	---	(4.68)
% Minority--Industry	---	-.8005	---	-.5723	---	---	---	-.5404	---	-1.1728
	---	(2.91)	---	(2.34)	---	---	---	(1.96)	---	(6.22)
% Minority--Occupation	---	---	---	---	---	---	---	-.4403	---	-.4564
	---	---	---	---	---	---	---	(1.94)	---	(2.57)
% Black Male--Occupation	---	---	---	---	---	---	---	---	---	---
% White Female--Occupation	---	---	---	---	---	---	---	---	---	---
% Black Female--Occupation	---	---	---	---	---	---	---	---	---	---
INDUSTRY MODULE										
Concentration	---	.6848	---	.8154	---	---	---	.5214	---	.4502
	---	(4.74)	---	(6.21)	---	---	---	(2.65)	---	(3.64)
Union x Conc.	---	---	---	---	---	---	---	---	---	---
After-tax Profit	---	---	---	---	---	10.2611	---	---	---	5.3120
	---	---	---	---	---	(4.20)	---	---	---	(2.54)
Capital/Labor Ratio	---	---	---	---	---	.0104	---	---	---	.0019
	---	---	---	---	---	(5.15)	---	---	---	(3.80)
Government Demand	---	---	---	---	---	2.8019	---	---	---	---
	---	---	---	---	---	(2.26)	---	---	---	---
WORKING CONDITIONS MODULE										
Physical Demands	---	---	---	---	---	---	---	-.2574	---	---
	---	---	---	---	---	---	---	(2.24)	---	---
Negative Work Traits	---	---	---	---	---	---	---	---	---	---
R^2	.158	.234	.141	.495	.055	.292	.165	.378	.099	.333
SEE	.8189	.7831	.7467	.5758	.7043	.6131	.6173	.5413	.870[illegible]	.7524
MEAN	$2.87	$2.87	$2.39	$2.39	$2.01	$2.01	$1.86	$1.86	$2.48	$2.48
N	444	444	277	277	295	295	158	158	823	823

pressure of potential union organizing attempts. Non-union firms may pay union scale to forestall organizing drives. In this case, while unions may have an impact on absolute wage levels for all workers, there is no discernible effect on relative inter-industry rates. Concentration can still play a role in wage determination under these circumstances. It measures the ability of an industry to meet the prevailing standard set through collective bargaining in unionized sectors of the economy.

Black Males - The structure of the regression equation for black males in OCC STRATUM 5 is similar to that of white males with the exception of a significant and extremely powerful union membership factor. The human capital equation explains 14 percent of the variance in earnings with the same variables as in the white male equation. However, the effect of schooling on earnings is significantly lower for black men. An additional year of education increments the average wage by only 7.3 cents compared with over 12 cents for white men. This is a significant difference at better than the .02 level according to the standard test for a difference in means.[9] Using the internal rate of return method presented previously, the return for white males is approximately 3.5 percent while that of black men is less than 2.0.

As expected, migration pays off somewhat more handsomely for black men than for whites in the same occupation stratum. Again this is taken to reflect the importance of migration from the south.

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[9] $t' = 2.47$.

Within OCC STRATUM 5, membership in a trade union is critically important in the earnings function for black men. On average, black workers of this skill level who do not have access to a union earn $.62 less an hour. Union members thus earn 30.5 percent more than non-union workers, a percentage much larger than most institutional estimates with the exception of those reported in the research of Johnson and Youmans.[10] Semi-skilled manual black workers apparently are found in two kinds of industries: relatively high wage unionized industries where they are paid wages not far below that of their white male counterparts and relatively low wage non-union industries where they comprise a disproportionate share of the workforce. Which industry sector an individual can enter is crucial in determining his income.

The minority employment factor also helps to explain some of the variance in earnings. The $\pm 1\sigma$ evaluation of %MININD is valued at $.18 an hour. Concentration influences the wage rate as well. In this instance, the $\pm 1\sigma$ evaluation results in a hefty $.48 earnings differential for similarly qualified workers. The combined addition of the two stratification variables and the market power factor increases the $\bar{R}^2$ from .141 to .495 and reduces the standard error of the estimate from $.75 to $.58. Quite clearly the stratification theory explains a large part of the variance for this segment of the labor force.

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[10] See Johnson and Youmans, op. cit.

White Females - The "best fit" human capital equation does not explain much of the variance in earnings ($\bar{R}^2$=.055) for white women in this stratum. An additional year of schooling adds significantly less to average earnings than it does for white men and the internal rate of return on additional schooling is no more than that for black men (2.0%). Schooling taken in the south is worth only 4.5 cents per hour per year. None of the other human capital factors are significant at all.

Union membership is the only variable that appears in the stratification module. Membership adds $.25 to the wage rate over non-union workers in this group, an addition of 13 percent. The absence of %MININD and %MINOCC may be due to colinearity with the union membership variable, but this seems unlikely given the relatively small zero order correlations between these variables:

	Union Membership
%MININD	-.146
%MINOCC	-.099

Concentration was highly significant when regressed alone on white female earnings, but it consistently tended to undermine the integrity of the human capital module. Thus it was deleted according to the estimation procedure and three other variables were used as "quasi"-instruments: after tax profits, the capital/labor ratio, and government demand. Each of these variables measures some facet of "ability to pay" with the ±1σ evaluations yielding wage differentials of $.34, $.42, and $.18 respectively. Whether these effects are strictly additive was not tested. After the introduction of the STRAT and IND modules, the coefficient of determination rose to .292 and the SEE declined by $.09. Once again the institutional hypotheses appear to be valid after controlling for human capital.

Black Females - Unlike the white female results, both schooling and experience are important variables in explaining the wage distribution for black women in this stratum. Together these two explain 17 percent of the variance in earnings. Schooling is particularly powerful adding 13.6 cents an hour to the wage rate per year of education. This translates into a rate of return of 7 percent, much higher than for any of the other race-sex groups. For some unexplained reason, southern schooling does not detract from this return. Every additional year of labor force experience also appears to augment earnings, in this case by 1.8 cents per hour.

The stratification module is powerful as well. Both %MININD and %MINOCC are significant factors as well as union membership. Unionization adds about the same amount to earnings as it does for white women, $.27. In addition, the $\pm 1\sigma$ evaluations of %MININD and %MINOCC are valued at $.22 and $.18 respectively.

As in the equations for white and black men, concentration is also significant indicating a substantial degree of "complex crowding." The $\pm 1\sigma$ evaluation of the market power factor indicates a $.30 wage differential. Altogether, evaluation of the stratification and industry variables suggests a $.97 wage interval around a mean of $1.86.

The physical demands variable is significant in this equation as well, but once again its coefficient is of the "wrong" expected sign. The negative sign may be explained by the possibility of black female "entrapment" as janitresses. This is a particularly low wage job which has relatively heavy physical demands although the educational and training requirements are not especially lower than for operatives or assemblers.

When all of the variables are added, the complete equation explains more than twice the variance explained by the human capital module alone. Thus even here where the human capital variables are relatively powerful, stratification factors still play a significant role in wage determination.

Cross Race-Sex - The human capital equation for the pooled regression explains only 10 percent of the variance in earnings within OCC STRATUM 5. In this regression additional years of schooling are worth \$.08 per year except in the south where they return only \$.05. Migration is also significant reflecting the importance of this variable for both groups of men as suggested in Chapter III. In addition, however, the training variable turns out to be powerful (\$.31) and significant at more than the .01 level. Training was never significant within the individual race-sex equations thus suggesting the possibility that training has an effect on wages between races or sexes but not within them.

There is a bit of evidence in the data that training opportunities are greater for men than for women, at least in this occupation stratum.

Thirteen percent of white males in this group had some institutional training and 12 percent of black men. However, only 7 percent of white females and an insignificant number of black women were exposed to vocational training. It is then possible that differences in training within the white male group, for instance, are not important enough to be manifest in a significant coefficient. However the difference in training opportunities between white men and black women, for example, may be great enough to generate the large positive coefficient found on this variable. This conclusion is enhanced by the fact that once the race and sex variables are added into the complete equation, the coefficient on training falls from .3118 to .1898.[11] All of this may be taken as evidence that the "structure" of human capital endowments is important in addition to its absolute "quantity."

Inclusion of the stratification and industry modules more than triples the $\bar{R}^2$ and reduces the SEE by \$.12. Union membership is worth \$.26 an hour while the two minority employment variables are valued at \$.41 and \$.16 according to our standard $\pm 1\sigma$ evaluation. The impact of industry segregation is thus nearly identical in both this stratum and the lower skilled 1-3 group. This is not true for occupational segregation. In the former stratum the standard evaluation of %MINOCC furnished a \$.58 wage differential. This should come as no surprise, however. Occupation stratum 1-3 includes a broad range of specific jobs while group 5 is overwhelmingly composed of industry operatives. In this case we would expect to find the major differences in earnings related to industry attachment rather than occupational category. Occupational crowding plays a role in wage determination even here, but apparently a minor one.

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[11] An identical phenomenon will be found in the "grand" pooled regression reported later in this chapter.

Concentration, after-tax profits, and the capital/labor ratio are also significant in the pooled regression. Summed together the three are worth a substantial \$.64 an hour based on the standard evaluation.

Adding race and sex dummies to the complete equation seriously affects the coefficients on the STRAT and IND variables as well as the value of the training parameter. Equation (II) reports these results.

(II)

$$
\begin{aligned}
w = 1.8742 &+ \underset{(6.13)}{.0613}\ \text{Schooling} - \underset{(3.60)}{.0205}\ \text{School-South} + \underset{(2.34)}{.1898}\ \text{Training} \\
&- \underset{(3.03)}{.1494}\ \text{Migration} + \underset{(4.43)}{.4012}\ \text{Union Member} - \underset{(2.13)}{.4138}\ \text{MININD} \\
&- \underset{(1.07)}{.1944}\ \text{MINOCC} + \underset{(4.56)}{.7027}\ \text{Concentration} - \underset{(3.63)}{.4754}\ \text{Union x Conc.} \\
&+ \underset{(3.20)}{7.0780}\ \text{After Tax Profit} + \underset{(3.20)}{.0016}\ \text{Capital/Labor Ratio} \\
&+ \underset{(2.71)}{1.5487}\ \text{Government Demand} - \underset{(2.57)}{.1620}\ \text{Physical Demands} \\
&- \underset{(4.09)}{.3246}\ \text{Black} - \underset{(11.04)}{.6704}\ \text{Female} \qquad R^2 = .433 \quad \text{SEE} = .6955
\end{aligned}
$$

After the inclusion of race and sex, three more variables become significant while %MINOCC drops out of the equation. For one, the union-concentration interaction term is now significant. Evaluating this regression for union and non-union workers and at .20 and .60 concentration ratios (as was done by Weiss) elicits the impact of unionization under competitive vs. oligopolistic conditions. It also demonstrates the impact of the market power factor in a unionized industry vs. an industry not covered by collective bargaining. Among generally competitive industries with workers in OCC STRATUM 5, union affiliation increases the average wage by \$.31 an hour or 13.7 percent according to evaluation of the regression equation at different levels of concentration and unionization. In the more concentrated industries union membership is capable of increasing earnings by \$.11 an hour or 4.6 percent. Alternatively, greater concentration (from .20 to .60) raises earnings by about 12.6 percent in non-union industries and by 3.6 percent when a union is present. These results are more consistent with those of Stafford than Weiss in that both unionization and concentration are still significant after controlling for the human capital variables.[12] Workers who end up in concentrated

	Concentration (MPF)		
	20%	60%	
No union	\$2.23	\$2.52	+12.6%
Union	\$2.54	\$2.63	+ 3.6%
	+13.7%	+4.6%	+17.9%

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[12] Recall that in Weiss's study, the addition of personal characteristics to the regression all but destroyed the significance of the concentration term. The statistically significant coefficients

unionized industries earn approximately 18 percent more than nonunion labor in the competitive sector.

In addition to the now significant interaction term, government demand also affects wage determination in this stratum. A ±1σ evaluation of its coefficient elicits an additional \$.14 difference in earnings. Physical demands is the third newly significant variable after the addition of race and sex. Its coefficient is negative, possibly displaying once again the "entrapment" of black females in low wage physically demanding jobs.

The coefficient on the race dummy is -\$.32 while that on sex is -\$.67. After the inclusion of both variables the coefficient on %MININD declines precipitously from -1.1728 to -.4138 and %MINOCC becomes totally insignificant. Clearly only a portion of the wage differential between race-sex groups in this stratum can be positively identified as directly linked to industrial and occupational crowding. Much of the differential may be due to either pure wage discrimination within specific industries or occupations or due to segregation between firms rather than between industries. The high degree of colinearity between the dummies (i.e. sex) and the minority employment variables makes it impossible to definitively differentiate these effects. (See Table 5.4.)

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in our results can be explained by the improvement in the measurement of concentration (through the use of the "market power factor") and the micro measurement of union membership. See Leonard Weiss, op. cit., p. 108.

TABLE 5.4

PARTIAL (X^tX) MATRIX FOR OCCUPATION STRATUM 5

	Race	Sex	%MININD	%MINOCC
Race	1.000	-.062	-.039	-.060
Sex		1.000	.451	.420
%MININD			1.000	.302
%MINOCC				1.000

Nevertheless the consistent appearance of the STRAT variables in the individual race-sex equations suggests an extensive degree of crowding and together with the race-sex variables demonstrates an even larger degree of overall stratification. Within the full labor force (at least within stratum 5) there are large wage differentials tied to factors which measure racial and sexual discrimination--in one form or another--after controlling for differences in human capital endowments. In addition there is strong evidence that substantial imperfections exist within this stratum's labor market even for white males. In this sense the traditional institutionalist and social stratification arguments are strongly upheld by both the individual race-sex equations and in the pooled regressions.

OCCUPATION STRATUM 6-9

Occupation stratum 6-9 is composed of a broad range of specific occupations which demonstrate a definite distinction between "men's" and "women's" work and "white" and "black" work in the American economy. This particular stratum is also noted for being the most heterogeneously skilled of the five occupation groups used in this analysis. Each of its specific occupations falls within a narrow range of required "general educational development" (GED) but potentially spans a wide range of "specific vocational preparation" (SVP) requirements. On-the-job training can range from just six months to, in rare cases, almost ten years (see Appendix A). For this reason many of the results are not comparable to those found in other more narrowly defined strata. In the whole spectrum of occupations from least to most skilled, we will find the regression results for this group to be the most anomalous.

Over 46 percent of white men in this stratum are found in just four specific occupations: truck and tractor drivers, general (semi-skilled) carpenters, welders, and policemen. The four most popular occupations for black men include truck drivers, but the other three are shipping and receiving clerks, stock clerks, and hospital attendants. Almost 55 percent of all black men in this stratum are found in these occupations.[13]

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[13] This comparison probably understates the difference in occupation categories for white and black men. There is no distinction between long-haul and intra-city trucking in the specific occupation categories given by the census. If such data were available it would probably indicate that white men dominate inter-city trucking while most black truck drivers are found on local routes. Earnings are considerably different for the two kinds of work.

White women are found in a different set of occupations altogether. Almost 60 percent are found in just three occupations: sewers and stitchers, hospital attendants, and receptionists. More than 74 percent of black women are consigned to jobs as hospital attendants, practical nurses, and sewers and stitchers in the apparel industry. This extreme occupational segregation is one of the main determinants of wage differentials according to the regression analysis.

The average worker in OCC STRATUM 6-9 had no more formal education than the typical worker in OCC STRATUM 5, nor any longer labor force experience. However the specific on-the-job training required for these occupations is somewhat greater, as we noted, taking in most cases between six months and a year to complete and in a few cases more. Almost 13 percent of the workforce reported enrollment at some time in an institutional training program. Only 9 percent of the workers in this stratum are black and only 27 percent are female.

Again over half of the stratum's workforce are members of trade unions, but the variance by race-sex group is extreme.[14] Fifty-six

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[14] The large variance in union membership by race and sex is found not only in occupation stratum 6-9 but in all other strata as well. White men are more organized than black men and both male groups always exceed the unionization rates for both groups of women. The mean union membership rates by stratum are reproduced below. (See Appendix B.)

	Union Membership Rates (%)				
Occupation Stratum	1-3	5	6-9	12-14	15-17
White Males	58%	60%	56%	44%	11%
Black Males	47	55	44	37	n.a.
White Females	32	41	43	10	10
Black Females	29	47	40	n.a.	n.a.
Total Workforce	50%	52%	52%	38%	11%

percent of white men are union members; but only 44 percent of black men; 43 percent of white women and 40 percent of black females. The average occupation has a minority workforce of approximately 30 percent, but as expected the standard deviation for %MINOCC is as large as the mean.[15] What is ironic about OCC STRAT 6-9 is that the segregation of the workforce appears to be so complete that the stratification and industry variables are not particularly important within individual race-sex regressions. In this case, only the pooled regressions can uncover the effect of "crowding" due to racial and sexual segregation. Table 5.5 contains the regressions for this stratum.

White Males - Both the human capital equation and the complete equation for white males have few significant variables. Only schooling is important in the HC module and this one variable explains only 6.3 percent of the variance. An additional year of education is worth a relatively small $.09 an hour.

The important factor in this stratum is union membership. Consistent with what is generally known about the specific occupations in this stratum, unionization is worth more than $.76 an hour thus forging a 28 percent wage differential between union and non-union workers. In no other occupation group is union membership so important for white men. In addition, there is a significant coefficient on the

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[15] The actual coefficient of variation on %MINOCC is 1.08 while that on %MININD is .63.

TABLE 5.5

REGRESSION EQUATIONS: OCCUPATION STRATUM 6-9 BY RACE AND SEX

	White Male		Black Male		White Female		Black Female		Cross Race-Sex	
Constant	2.0699	1.9847	2.2122	1.6901	1.9361	1.6422	1.2439	1.5608	1.2216	2.6503
HUMAN CAPITAL MODULE										
Schooling	.0927	.0791	.0764	.0597	---	---	.0678	.0506	.0560	.0511
	(4.30)	(4.04)	(3.45)	(2.96)	---	---	(2.29)	(2.23)	(3.15)	(3.45)
School-South	---	---	-.0477	-.0275	---	---	-.0333	-.0317	-.0318	-.0196
	---	---	(3.27)	(2.02)	---	---	(2.50)	(3.18)	(3.05)	(2.18)
Training	---	---	---	---	---	---	---	---	---	---
Migration	---	---	-.5384	-.3526	-.1917	-.1014*	---	---	---	---
	---	---	(4.18)	(2.93)	(2.08)	(1.12)	---	---	---	---
Experience	---	---	---	---	---	---	---	---	---	---
Specific Voc. Prep.	---	---	---	---	---	---	---	---	.2021	---
	---	---	---	---	---	---	---	---	(4.62)	---
STRATIFICATION MODULE										
Union Member	---	.7647	---	.5961	---	.3328	---	.4966	---	.6746
	---	(7.28)	---	(4.42)	---	(3.54)	---	(4.57)	---	(8.21)
% Minority--Industry	---	---	---	---	---	---	---	---	---	-1.2192
	---	---	---	---	---	---	---	---	---	(4.3[illegible])
% Minority--Occupation	---	---	---	---	---	---	---	---	---	-.7525
	---	---	---	---	---	---	---	---	---	(3.73)
% Black Male--Occupation	---	-2.5825	---	---	---	---	---	---	---	-2.4924
	---	(2.31)	---	---	---	---	---	---	---	(2.67)
% White Female--Occupation	---	---	---	---	---	---	---	---	---	---
% Black Female--Occupation	---	---	---	---	---	---	---	-4.4168	---	---
	---	---	---	---	---	---	---	(2.86)	---	---
INDUSTRY MODULE										
Concentration	---	---	---	.6535	---	.6042	---	---	---	---
	---	---	---	(2.77)	---	(2.57)	---	---	---	---
Union x Conc.	---	---	---	---	---	---	---	---	---	---
After-tax Profit	---	---	---	---	---	---	---	---	---	---
Capital/Labor Ratio	---	---	---	---	---	---	---	---	---	---
Government Demand	---	---	---	---	---	---	---	-6.0458	---	---
	---	---	---	---	---	---	---	(3.52)	---	---
WORKING CONDITIONS MODULE										
Physical Demands	---	---	---	---	---	---	---	---	---	---
Negative Work Traits	---	---	---	---	---	---	---	---	---	---
R^2	.063	.238	.156	.320	.040	.166	.187	.620	.091	.380
SEE	.9506	.8601	.8725	.7874	.4733	.4453	.4416	.3140	.9563	.7927
MEAN	$2.96	$2.96	$2.36	$2.36	$1.84	$1.84	$1.72	$1.72	$2.60	$2.60
N	279	279	186	186	106	106	43	43	423	423

variable for percent black male employment in an occupation (%BMOCC). The usual ±1σ evaluation of this factor yields an added wage differential of $.24 an hour. Together these two stratification factors are thus valued at $1.00 or just slightly less than a third of the average wage. After their addition, the industry module adds nothing suggesting that differences in demand characteristics mean relatively little if anything after supply constraints play their role. While not an especially well-specified equation, the regression indicates that (1) differences in human capital are not particularly important in explaining wage differentials within this stratum and (2) that labor market stratification is the main actor in determining the distribution of earnings.

Black Males - The black male equation is similar to that of white men with the exception of the importance of migration and concentration. An additional year of schooling is worth 7.6 cents an hour which according to the means test is not significantly different from the schooling coefficient for white men in this stratum.[16] Again however, as in OCC STRATUM 1-3, the rates of return on additional schooling are so low for both groups that this apparent equality is not especially valuable for black men. Schooling in the south is worth even less, yielding only $.03 an hour.

As in every other black male regression, migration is highly significant and powerful. Those who do not migrate during their lifetime earn \$.54 less per hour. For a full-time full-year worker this is equivalent to almost \$1100 a year.

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[16] t' = .57.

As noted previously, industry and occupation segregation by race and sex can be so extensive that %MININD and %MINOCC would not be significant variables within individual equations. This is apparently true for the black male regression. Neither of these variables is significant. However, union membership is, and once again as in OCC STRATUM 5 its effect is robust. There is a \$.60 wage gap between union and non-union workers which represents a 28 percent differential exactly the same as for white men. This is roughly equivalent to the difference in wages found between a black unionized maintenance painter (\$2.75) and a skilled non-union hospital attendant (\$2.15).

After the inclusion of union membership, concentration adds to the wage differential as well suggesting a case of complex crowding. Unlike for white men, industry demand characteristics apparently affect relative wages. The ±1σ evaluation is worth 35 cents an hour. With unionization and concentration included in the regression, the $\bar{R}^2$ more than doubles to .320 and the SEE declines by \$.085.

White Females - The human capital equation for white women in this group explains only four percent of the variance and neither education, training, experience nor specific vocational preparation is significant in this regression. Only migration is significant and its coefficient is a relatively small -\$.19. The addition of union membership and concentration raises the $\bar{R}^2$ to .166, although this occurs only after the estimation rule concerning the integrity of the human capital module is violated. Union membership is worth \$.33 an hour or 19.7 percent. The ±1σ evaluation of the concentration ratio is valued at 23 cents an hour. Although this regression is not particularly well fitted, it suggests that within this stratum almost all of the explained variance in earnings is due to industrial and occupational attachment. This is not an unreasonable conclusion given the heterogeneous set of "women's" occupations represented in STRATUM 6-9, all of which have very similar GED and SVP ratings but differ in terms of industrial characteristics.

Black Females - In contrast to the white female equation, the regression for black women is quite servicable. The human capital module explains almost 19 percent of the variance with the two variables schooling and school-south. An additional year of education is worth 6.8 cents excepting the south where its value is less by 3.3 cents.

The addition of the STRAT and IND modules increases the $\bar{R}^2$ to .620, the highest of any equation in the analysis. The standard error of the estimate is only \$.31 after the introduction of these modules. Union membership is worth almost \$.50 an hour. This represents a 33 percent differential between union and non-union workers. A further indication of the effects of labor market crowding is found in the ±1σ evaluation of percent black female employment in an occupation (%BFOCC). This yields an additional differential of \$.30. For occupations that are even more "impacted" with black females the effect is, of course, larger. The wage rate for hospital attendants, for example, is \$.57 an hour lower than in occupations with only the average percentage of black females. Quite obviously occupational "crowding" severely affects earnings in this stratum.

In the industry module there is an unexpected sign on the government demand variable. Here we find that a $\pm 1\sigma$ increase in government demand apparently lowers the wage rate of black women by nearly \$.19 an hour. This is the only instance in the entire analysis when a statistically significant government demand variable had a negative coefficient. This rather puzzling result was found to be merely a function of the peculiar industry composition in the micro data for this regression.[17] No other industry variables were significant so that our overall assessment is one of "simple"--but extensive--crowding.

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[17] Since we do not have a measure of government demand for the "hospital" industry in our data set, the coefficient cannot be due to the lower wages paid to hospital attendants in government subsidized hospitals. Another solution was necessary. The puzzle was finally solved after perusing the original data on government purchases by industry. The weighted mean level of government expenditures in the industries in this regression was 2.8 percent of gross sales. There is one industry in the whole data set which sells a larger percentage of its product to the government and also employs a relatively large number of black women in this occupation stratum. This industry is "Miscellaneous Fabricated Textile Products" employing a large number of sewers and stitchers. It sells over 4.5 percent of its annual production to government agencies. With a low market power factor (.1043), a relatively low profit rate (2.5%), and an extremely high proportion of minority workers (60.7%), the average wage rate in the industry is relatively low (\$2.10 an hour in 1967). Black women, according to the data, have little access to other industries which have large government contracts, but also higher average wages. Consequently, in this single case, there is a negative relationship between government purchases and individual earnings. This result is not inconsistent with the general stratification theory.

Cross Race-Sex - Because of the extensive occupational segregation in this stratum by both race and sex, there is a strong tendency for the individual equations to underestimate the impact of crowding on the distribution of earnings. Consequently the pooled regressions may give better estimates of its effect.

In these equations the human capital variables are responsible for explaining only 9.1 percent of the variance in earnings. Formal schooling has a relatively weak impact on wages, an additional year adding only 5.6 cents to hourly earnings and less than half as much if the schooling was completed in the south. However, for the first time in the analysis, specific vocational preparation is significant suggesting the critical nature of on-the-job training in the occupations within this group. The fact that SVP is statistically significant in the pooled regression while insignificant in each of the individual equations suggests that access to jobs which provide apprenticeship (or other forms of investment in OJT) is linked directly to race and sex. White males have freest access to training while the other race-sex groups are provided with a lower average level of SVP.[18]

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[18] The mean SVP scores for each race-sex group are:

	$\overline{SVP}$	σ_{svp}
White Males	4.79	1.15
Black Females	4.37	.82
White Females	4.35	.78
Black Males	4.33	.93
Cross Race-Sex	4.65	1.07

The addition of the STRAT variables compromises the integrity of the human capital module in that SVP now disappears from the regression. In this case we have permitted this to occur for while the letter of the estimation procedure is violated, we feel its "spirit" is not. The original intent of using a surrogate "two-stage" regression was to account for the sequential relationship between an individual's acquisition of human capital and his or her subsequent attachment to a specific industry and occupation. In the special case of SVP the presumed causal ordering is often the reverse. On-the-job training such as apprenticeship is only available after a worker has gained access to a particular job or occupation. If access is denied on the basis of race or sex, as it often appears to be in this group of occupations, then SVP acts more as a proxy for stratification than a traditional human capital factor. Not to violate the original estimation procedure under these circumstances would lead to seriously downward biased estimates of the effects of industrial and occupational segregation.

Before the race and sex factors are added to the complete equation, the introduction of the stratification module boosts the $\bar{R}^2$ to .38 and lowers the SEE by over 16 cents. Union membership alone is worth \$.67 an hour; those in organized industries or occupations consequently earn a full 30 percent more than those who are not. In addition, %MININD, %MINOCC, and %BMOCC are all highly significant. If strictly additive, the sum of the $\pm 1\sigma$ evaluations is worth over \$1.30 an hour, half the mean wage rate. Although quite hefty, this result is by no means unreasonable. It constitutes a differential not much larger than the actual differences in mean earnings between white men and white and black women. After the stratification module variables are added, none of the industry variables are significant. "Simple" crowding appears here to be the rule.

As expected the introduction of the race and sex factors severely reduces the strength of the variables in the stratification module with the exception of unionization. With the extreme occupation segregation found in this stratum, the complete pooled regression attributes much of the variance in earnings due to what we feel is occupational attachment to the micro measured race and sex dummies.[19] Equation (III) is the "best fit" complete regression including these variables.

(III)

$$w = 1.8476 + \underset{(3.74)}{.0532}\ \text{Schooling} + \underset{(2.23)}{.0799}\ \text{SVP} + \underset{(9.22)}{.6963}\ \text{Union Membership}$$

$$- \underset{(2.90)}{.7200}\ \%\text{MININD} - \underset{(4.18)}{.5476}\ \text{Black} - \underset{(5.41)}{.6763}\ \text{Female}$$

$$\bar{R}^2 = .421 \qquad \text{SEE} = .7659$$

Union membership continues to be worth almost $.70 an hour clearly labeling access to a unionized occupation as the surest admission ticket to higher earnings in this stratum, after controlling for human capital. SVP is significant once again, but use of the difference in means test indicates that its coefficient in the final equation is statistically lower than in the equation which contains only the human capital variables. (t'=2.16)

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[19] The zero order correlations for %MINOCC and sex = .810
%BMOCC and race = .560

All of these results are consistent with what we know about the specific occupations within this OCC STRATUM. The Teamsters' and the carpenters' union, for instance, have historically won wage packages which are among the highest within the occupation spectrum. Workers who gain access to these jobs or the other crafts gain from the collective bargaining efforts of their unions; those who for one reason or another do not enter these occupations will normally earn much lower wages, _ceteris paribus_. This particularly affects the earnings of women, but also limits the earning power of black men. The effect of stratification, either in the form of "crowding" or pure discrimination, appears to reach its peak in this stratum. Again, however, because of the high degree of segregation, it is statistically impossible to differentiate between the two forms. Differences in human capital--with the exception of SVP--only account for a small fraction of the explained variance in earnings.

OCCUPATION STRATUM 12-14

For men, OCC STRATUM 12-14 primarily contains individuals who are defined by the Census as "craftsmen, foremen, and kindred workers." The largest specific occupation for white men if "foremen" (17.7%) followed by "mechanics and repairmen, n.e.c." (14.5%) and "machinists"

(8.5%). "Linemen and servicemen," "plumbers and pipefitters," and "electricians" are also members of this group. For black men, the largest single group is "mechanics and repairmen, n.e.c." (19.5%) followed by "auto mechanics" (14.5%) and "foremen" (12.1%).

In contrast to both groups of men, most white women in this occupation group are found in white collar jobs; almost two-thirds (64.7%) are classified as "secretaries." Much smaller percentages are found as medical and dental technicians and department heads and buyers in retail outlets. The number of black women in this stratum is so small that no statistically significant results could be obtained.

The typical worker in this category had eleven years of schooling (10.8 years) and over 30 percent reported receiving some form of institutional training. White females had, on average, more schooling (11.4 years) but only 21 percent reported previous enrollment in a vocational education program. The average occupation in this stratum requires between two and four years of on-the-job training according to the SVP scale. A few jobs require more.

Consistent with the specific occupational composition of this stratum, a much smaller percentage of workers are trade union members (38.4%). Foremen have been discouraged from organizing into unions since Taft-Hartley and few secretaries and mechanics are members. Only about 4 percent of the stratum is black and only 15 percent are women reflecting the dominance of white men in these higher level occupations. Table 5.6 contains the regression results for this stratum.

TABLE 5.6

REGRESSION EQUATIONS:
OCCUPATION STRATUM 12-14 BY RACE AND SEX

	White Male		Black Male		White Female		Black Female		Cross Race-Sex	
Constant	-.2914	.2250	1.9477	1.9279	1.0390	-.0761	---	---	-2.9893	-.7516
HUMAN CAPITAL MODULE										
Schooling	.1593	.1244	.0719	.0545	.1152	.1068	SAMPLE SIZE		.1560	.1409
	(8.35)	(6.51)	(2.76)	(2.34)	(2.66)	(2.52)			(8.91)	(8.49)
School-South	-.0397	-.0385	---	---	---	---	TOO SMALL		-.0407	-.0370
	(4.58)	(4.64)	---	---	---	---			(5.15)	(5.00)
Training	---	---	.5840	.4125	---	---	FOR		---	---
	---	---	(2.65)	(2.14)	---	---	SIGNIFICANT		---	---
Migration	-.3527	-.2991	-.3493	-.3126	---	---	RESULTS		-.3148	-.2515
	(4.08)	(3.84)	(2.03)	(2.10)	---	---			(4.20)	(3.63)
Experience	.0097	.0070	---	---	---	.0166			.0101	.0084
	(2.55)	(1.89)	---	---	---	(2.16)	---	---	(2.81)	(2.55)
Specific Voc. Prep.	.2893	.2606	---	---	---	---	---	---	.6594	.2982
	(2.45)	(2.10)	---	---	---	---	---	---	(8.08)	(2.60)
STRATIFICATION MODULE										
Union Member	---	.3813	---	.4705	---	---	---	---	---	.3302
	---	(2.58)	---	(2.97)	---	---	---	---	---	(2.40)
% Minority--Industry	---	-.7850	---	-.8673	---	---	---	---	---	-1.0525
	---	(3.18)	---	(2.14)	---	---	---	---	---	(5.25)
% Minority--Occupation	---	---	---	---	---	---	---	---	---	-.4151
	---	---	---	---	---	---	---	---	---	(2.16)
% Black Male--Occupation	---	-8.0053	---	---	---	---	---	---	---	---
	---	(3.78)	---	---	---	---	---	---	---	---
% White Female--Occupation	---	---	---	---	---	---	---	---	---	---
% Black Female--Occupation	---	---	---	---	---	---	---	---	---	---
INDUSTRY MODULE										
Concentration	---	.9911	---	.8951	---	---	---	---	---	1.1334
	---	(5.56)	---	(3.24)	---	---	---	---	---	(7.03)
Union x Conc.	---	-.7066	---	---	---	---	---	---	---	-.7677
	---	(2.77)	---	---	---	---	---	---	---	(3.24)
After-tax Profit	---	---	---	---	---	18.6527	---	---	---	6.3150
	---	---	---	---	---	(4.61)	---	---	---	(3.05)
Capital/Labor Ratio	---	---	---	---	---	.0071	---	---	---	---
	---	---	---	---	---	(2.33)	---	---	---	---
Government Demand	---	---	---	---	---	---	---	---	---	---
WORKING CONDITIONS MODULE										
Physical Demands	---	---	---	---	---	---	---	---	---	---
Negative Work Traits	---	.1187	---	---	---	---	---	---	---	.1218
	---	(2.98)	---	---	---	---	---	---	---	(3.23)
R^2	.160	.252	.193	.424	.059	.277	---	---	.203	.336
SEE	1.0344	.9799	.9091	.7773	.8962	.7960	---	---	1.0530	.9654
MEAN	$3.50	$3.50	$2.59	$2.59	$2.36	$2.36	---	---	$3.29	$3.29
N	674	674	128	128	115	115	---	---	820	820

White Males - All of the human capital variables with the exception of institutional training are significant in the white male equation. An additional year of education is worth almost $.16 an hour; in the south almost $.12. Non-migrants earn $.33 less per hour while each additional year of labor force experience is valued at almost $.01. Apparently experience only begins to play a role in earnings functions in the relatively skilled occupations; within each of the lower level strata the wage-experience profile is flat. Finally each unit in the SVP scale adds $.29 to the hourly wage. Taken together these five factors explain 16 percent of the variance in earnings.

Even within this relatively high skilled occupation stratum, the stratification and industry modules are responsible for a large increase in the coefficient of determination. The $\bar{R}^2$ rises to .252 after these variables are entered. The differential in earnings due to industry segregation is almost $.25 an hour which is equivalent to a 7.3 percent wage differential. There is an additional $.32 or 9.7 percent differential due to the "crowding" of black men into certain occupations (%BMOCC).

Union membership and concentration each increase the wage rate as well, but again the interaction term is negative. Among generally competitive industries (MPF=.20), union membership adds $.24 to hourly earnings or 7.4 percent. Among concentrated industries, however, union membership apparently adds nothing extra to the wage rate. Above a concentration ratio of .54, in fact, the statistical

	Concentration (MPF) 20%	60%	
No union	$3.25	$3.65	+12.3%
Union	$3.49	$3.60	+ 3.2%
	+7.4%	-1.4%	+10.8%

relationship between unionization and earnings is slightly negative.[20] In the unorganized sector oligopolies pay an average of 12.3 percent more than do competitive industries. In the union sector a 40 point differential in the market power factor is worth no more than an additional 11 cents or 3.2 percent. Yet, overall, after we control for human capital differences, a unionized highly concentrated industry pays wages which are $.35 an hour or 10.8 percent greater than an industry which is unorganized and competitive. The importance of the industry and stratification variables thus prevails even among relatively highly-skilled white men.

One other point might be added. In the complete equation, the negative working traits factor in the working conditions module is significant and of the expected positive sign. The average occupation in this stratum for white men has approximately one (.93) negative trait with a standard deviation of nearly one (.98). After controlling for all other factors, a worker in an occupation with one extra negative trait earns $.12 more per hour in compensatory payments. What this appears to signify is that among relatively skilled (white male) workers, but not among the unskilled, wage rates respond to the "quality" of the job in a compensatory manner.

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[20] The apparent negative effect of union membership on wage rates in highly concentrated industries may, in fact, have some substance to it. It seems plausible that non-union concentrated industries may pay higher straight-time wages in order to ward off the sympathetic pressure for unionization. The unionized industries on the other hand may settle on a total economic and non-economic package which realizes a lower straight-time rate, but makes up for it with larger fringe benefits including longer vacations, more numerous holidays, fully-paid medical insurance, life insurance, large pensions, etc. In this case, unionization may mean lower straighttime wage rates but higher total remuneration. The regression cannot measure this effect.

Black Males - An additional year of education is worth significantly less to a black male worker than to a white male in this stratum.[21] What is more, the rate of return on schooling is the lowest of any occupation group for black men reflecting both the higher opportunity costs of additional education and the near constant dollar value of schooling exhibited in each of the strata.[22] On the other hand, institutional training pays off handsomely, contributing $.58 an hour to the wage rate. This most likely represents the return to specific training in fields like auto mechanics. As usual migration is an important factor for black men, contributing here

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[21] The difference in means test yields a t'=2.57.

[22] The dollar values and the internal rates of return for a year of schooling for black men by occupation stratum are:

Occupation Stratum	Dollar Value	Internal R of R
1-3	$.0779	>2.0%
5	.0733	2.0
6-9	.0764	<2.0
12-14	.0719	<1.25
15-17	n.a.	n.a.

almost $.35 an hour. The value of migration is similar to that found in OCC STRATUM 1-3 and 5 although below that in stratum 6-9.

Even within this relatively skilled group, the addition of the STRAT and IND modules more than doubles the $\bar{R}^2$ to .424 and lowers the SEE by $.13. Union membership is worth $.47 an hour and there is no apparent negative interaction between unionization and concentration as there is for white men. This may be due to the fact that on average black workers in this stratum are found in much less concentrated industries. The mean MPF for white men is .46; that for black men only .36. The regression, in this case, was not capable of isolating the impact of concentration on the wage effect of union membership for the few black workers in oligopolistic industries. Translated into percentage terms, the $.47 wage increment due to union affiliation is responsible for a 19.5 percent wage differential, a rate more than twice as large as that for white men in the same stratum. This adds to the mounting evidence that unionization while important for white men is much more so for black males in every single stratum. In this case, access to the organized skilled crafts is the port of entry to higher earnings, human capital constant.

Industry segregation has an additional effect on relative earnings. The ±1σ evaluation of %MININD is valued at $.32 an hour. In dollar terms, this is a bit larger than for any of the other strata. In the industry module, the same evaluation of concentration is valued at $.54, indicating that the few black men who do gain access to oligopolistic industries benefit substantially. Here "complex" crowding seems to prevail. If strictly additive, union membership, %MININD, and concentration would furnish a wage differential of $1.33, more than half the mean wage for this group. This is equivalent to wage rates of $1.93 vs. $3.26 an hour.

White Females - Before the introduction of the industry module, the only significant human capital variable is schooling. Each year is worth 11.5 cents an hour, higher than in any previous group. After the addition of the industry module years of experience in the labor force also appears as a significant factor in the earning generating function. Each year is valued at about 1.7 cents per hour which translates into a wage differential of $.33 between a woman who is 25 years of age and one who is 45.

None of the factors in the stratification module are significant including union membership; yet two of the industry or "demand" side variables are. According to theory there must be other factors beside unionization and minority segregation which serve to segment the labor force. Imperfections in job information and inter- and intra-labor market immobility due to geographical barriers may be factors sufficient to offset the tendency toward wage equalization as indicated by statistically significant variables in the industry module.

These results are understandable in light of this stratum's occupation composition. With 65 percent of the workforce as "secretaries," only 10 percent of the workforce unionized, and the mean percent of white females in an occupation greater than 70 percent, the majority of the variance in earnings, after controlling for human capital, is probably due to the pure institutional factor of "ability to pay." Within the stratum, minority crowding and unionization are not particularly important, but which industry a secretary has access to apparently affects the wage. A secretary in an industry which has a profit rate ±1σ above the mean will earn, on average, \$.35 more per hour. In an industry which has ±1σ more capital per production worker the average wage will be \$.17 higher.[23] The addition of just these two variables is sufficient to more than quadruple the explained variance and again suggests the tremendous importance of industry attachment for minority members of the labor force.

Black Females - SAMPLE SIZE TOO SMALL FOR STATISTICALLY SIGNIFICANT RESULTS.

Cross Race-Sex - As in occupation stratum 6-9, the individual race-sex equations may underestimate the impact of crowding. This is particularly true because of the nearly complete segregation of white women in this stratum. The pooled regressions are therefore of value in attempting to identify the true relationship between "crowding" and earnings.

With the exception of institutional training, all of the factors in the human capital module in the pooled regression are highly significant and explain about a fifth of the variance in earnings. Unlike the weak effect of schooling in the previous stratum, here a year of education is worth in excess of $.15 an hour. (In the south, an additional year of school is valued at 11.5 cents.) Migration adds over $.31 to average hourly earnings and each year of labor force experience adds another $.01 to the wage rate.

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[23] It also seems plausible that "quasi-"sympathetic pressure may work within an industry. White collar personnel in industries with strongly unionized blue-collar workforces may benefit from the production workers' union without belonging. In the present equation it is possible that profits and capital-intensity are correlated with the extent of blue collar unionism and consequently produce this phenomenon.

As expected, specific vocational preparation (SVP) is a potent factor in the earnings function reflecting the prime importance of apprenticeship in the skilled trades. At the same time, the absence of this factor in the equations for black men and white women and its weaker presence in the white male equation exposes the nature of the link between demographic characteristics and access to occupations which offer apprenticeship. The link runs first from race and sex to occupation and then from occupation to specific training. Access to a job with an SVP rating one unit higher than the mean is worth nearly $.66 an hour. The addition of the stratification, industry, and working conditions modules reduces the coefficient on SVP by more than half and the further addition of the dummy for sex eliminates SVP altogether. Once again we have allowed this to occur because of the presumed causal relationship involved in the function.

The final complete equation including variables for race and sex is shown in Equation (IV).

(IV)

$$\begin{aligned} w = 1.7244 &+ \underset{(7.52)}{.1264}\text{ Schooling} - \underset{(4.89)}{.0354}\text{ School-South} - \underset{(3.84)}{.2601}\text{ Migration} \\ &+ \underset{(2.66)}{.0088}\text{ Experience} + \underset{(2.98)}{.3991}\text{ Union} - \underset{(4.29)}{.8550}\text{ \%MININD} \\ &- \underset{(4.55)}{7.3783}\text{ \%BMOCC} + \underset{(6.10)}{.9492}\text{ Concentration} - \underset{(3.60)}{.8240}\text{ Union-Conc.} \\ &+ \underset{(2.78)}{5.5602}\text{ After-tax Profit} + \underset{(3.59)}{.1304}\text{ Negative Work Traits} \\ &- \underset{(8.28)}{.8806}\text{ Sex} \qquad R^2 = .370 \quad SEE = .9411 \end{aligned}$$

Except for SVP, the integrity of the original human capital equation is preserved.

The dummy variable for race is insignificant after controlling for %MININD and black male employment (%BMOCC). While there may still be some pure racial discrimination within industries, occupation, and specific firms, the dominant stratification effect appears to be related more directly to industrial and occupational crowding. Moreover the crowding hypothesis is supported by evidence that the inclusion of the sex variable has only a minor deteriorating effect on the coefficient on %MININD and none on %BMOCC. Without the dummy variable, the $\pm 1\sigma$ evaluations of these two factors are wroth \$.37 and \$.23 respectively. After the dummy is added, the value on %MININD falls by only 7 cents and the coefficient on %BMOCC actually rises by \$.11. Thus pure sex discrimination exists simultaneously with crowding leaving the average female \$.88 an hour worse off.

On the demand side, union membership and concentration interact in an almost identical fashion in the pooled regression as in the white male equation. Among unorganized workers, a forty point difference in the concentration ratio is responsible for a 12 percent difference in average hourly earnings. In competitive industries, union membership is worth about $.23 or 7.4 percent; in concentrated industries, unionization adds nothing to the wage rate. All in all there exists a 9.0 percent wage differential between similarly skilled workers in unionized concentrated and unorganized competitive industries.

	Concentration (MPF)		
	20%	60%	
No union	$3.10	$3.48	+12.25%
Union	3.33	3.38	+ 1.50%
	+7.4%	-2.9%	+ 9.0%

Higher after-tax profits also affect earnings in this stratum independent of unionization and concentration. The average wage rate in an industry with after-tax profits ±1σ higher than the mean is $.10 greater than for workers in the "average" industry. As in the white male equation, negative work traits is also significant and of the expected positive sign, indicating again that at least at this higher skill level, compensatory wage payments are necessary to induce a sufficient supply of labor to the more "distasteful" jobs.

What we find most interesting about these results is that they show that even among relatively well-educated and skilled workers, large wage differentials can be traced to factors other than differences in human capital and working conditions. This begins to disappear only among the very most educated and skilled workers, those in occupation stratum 15-17.

OCCUPATION STRATUM 15-17

Unfortunately the number of blacks in the SEO's highest skilled occupation stratum is too small to allow individual statistical analysis. Consequently the results refer only to the white population except for the pooled race-sex equations.

White men are found in a plethora of specific professional and managerial occupations within this stratum. The largest numbers are found as accountants, insurance agents, draftsmen, and secondary school teachers. Others are found as pharmacists and engineers. In contrast over 68 percent of white women in this group are employed in just three occupations: as primary school teachers, high school teachers, and professional nurses.

The white males in the sample average over 14 years of schooling and nearly 45 percent have had some form of institutional training beyond their formal education. Very few (11%) are members of trade unions and the average minority employment in their occupations is only 10.8 percent. The white females in this stratum have slightly less education (13.0 years) and only one-fifth have had any vocational training outside of formal schooling. Union membership is weak for women as it is for men (10%) but the average minority employment in their occupations is three times the male rate (34%). Of total minority employment in this stratum over 90 percent are white women suggesting again the extremely small proportion of blacks in these occupations. Table 5.7 presents the regression results.

White Males - Among professionals and other highly skilled personnel, formal education becomes the primary variable explaining wage differentials. For white men, each year of education is worth more than twice its value in any of the lesser skilled strata. An additional year of schooling is worth $.33 an hour and there is no differential associated with where the schooling was taken. Only in this highest skilled stratum is there no discount for southern education. The importance of formal schooling is, of course, fully consistent with the type of training usually required for these professional occupations.

Migration also plays a role. A $.48 wage differential exists between migrants and those who have never moved from the area in which they lived at age 16. On a full-time full-year basis, this is equivalent to almost a $1000 annual salary differential. Years of experience is also especially important adding more than $.03 to hourly earnings per year of labor force participation. Each year of experience translates into an annual $60 salary premium. Finally specific vocational preparation adds nearly $.70 per SVP unit to the hourly wage. Altogether the human capital module explains about a quarter of the variance.

The addition of other modules to the equation does not appreciably improve the fit. The only significant variable is after-tax

TABLE 5.7

REGRESSION EQUATIONS: OCCUPATION STRATUM 15-17 BY RACE AND SEX

	White Male		Black Male		White Female		Black Female		Cross Race-Sex	
Constant	-5.3929	-6.3036	---	---	-.5661	-1.3813	---	---	-4.7987	-4.6604
HUMAN CAPITAL MODULE										
Schooling	.3253 (7.26)	.3192 (7.21)	SAMPLE TOO		.2620 (3.59)	.2853 (4.13)	SAMPLE TOO		.3513 (8.34)	.3196 (7.79)
School-South	---	---	SMALL FOR		---	---	SMALL FOR		---	---
Training	---	---	SIGNIFICANT		---	---	SIGNIFICANT		---	---
Migration	-.4[illegible]3 (2.01)	-.4123* (1.84)	RESULTS		--- ---	--- ---	RESULTS		-.4913 (2.20)	-.4622 (2.14)
Experience	.0318 (3.04)	.0351 (3.37)	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	.0279 (2.79)	.0320 (3.30)
Specific Voc. Prep.	.6707 (2.56)	.6934 (2.68)	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	.5322 (2.18)	.4544 (1.96)
STRATIFICATION MODULE										
Union Member	---	---	---	---	---	---	---	---	---	---
% Minority--Industry	---	---	---	---	---	---	---	---	---	---
% Minority--Occupation	---	---	---	---	---	---	---	---	---	---
% Black Male--Occupation	---	---	---	---	---	---	---	---	---	---
% White Female--Occupation	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	-2.4717[a] (3.82)
% Black Female--Occupation	---	---	---	---	---	---	---	---	---	---
INDUSTRY MODULE										
Concentration	--- ---	--- ---	--- ---	--- ---	--- ---	1.2463 (2.22)	--- ---	--- ---	--- ---	.7297 (2.13)
Union x Conc.	---	---	---	---	---	---	---	---	---	---
After-tax Profit	--- ---	15.5935 (2.73)	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	14.6214 (2.80)
Capital/Labor Ratio	---	---	---	---	---	---	---	---	---	---
Government Demand	---	---	---	---	---	---	---	---	---	---
WORKING CONDITIONS MODULE										
Physical Demands	---	---	---	---	---	---	---	---	---	---
Negative Work Traits	---	---	---	---	---	---	---	---	---	---
R^2	.247	.267	---	---	.316	.422	---	---	.254	.315
SEE	1.7809	1.7608	---	---	.8954	.8385	---	---	1.7765	1.7110
MEAN	$4.83	$4.83	---	---	$2.83	$2.83	---	---	$4.63	$4.63
N	287	287	---	---	30	30	---	---	322	322

[a] Percent Female-Occupation

profits; the ±1σ evaluation is worth \$.58 or 12 percent of the mean wage for this group. The addition of this factor increases the $\bar{R}^2$ by merely .02 and reduces the SEE by only 2 cents. For all intents and purposes stratification is not particularly responsible for the variance in earnings among white male professionals. It is only among this special group that the (relatively) pure human capital hypothesis holds.

White Females - The sample of white females is quite small, but some of the variance in earnings can be explained. In this case, however, only education is significant in the human capital module and this factor alone is responsible for 32 percent of the variance in earnings. Each year of formal schooling is worth at least \$.26 an hour which translates into a sizable 9 percent rate of return based on the method used throughout this analysis. This high rate of return is no doubt due to the effect of advanced degrees opening up access to occupations beyond teaching and nursing. Migration, experience, and SVP do not appear to explain any of the wage differential within this high skill strata of women.

The inclusion of the industry module adds considerably to the explanation of earnings. The only significant factor is concentration, but this variable alone raises the coefficient of determination to .422 and reduces the SEE from \$.8954 to \$.8385. The ±1σ evaluation of the market power factor is valued at \$.70 per hour which is equivalent to almost 25 percent of the mean wage for this group. Thus, while the pure human capital model seems to account for the overwhelming majority of explained variance among high skilled white men, other factors still play a significant role in explaining the earnings of white female professionals.

Cross Race-Sex - The cross race-sex equations contain a small number of black men and women as well as whites. The human capital module results are similar to those for white men, but in addition variables in both the stratification and industry modules are significant.

The human capital module contains schooling, migration, experience, and SVP. Each of these factors has a regression coefficient similar to those in the white male equation. In addition, before adding the race and sex dummies, the percent of female employment in an occupation (%FMOCC) is highly significant and the ±1σ test has a value of \$.76 an hour. In the industry module both concentration and after-tax profits are significant variables with the ±1σ evaluation worth \$.42 and \$.54 respectively. The inclusion of these three variables raises the $\bar{R}^2$ from .254 to .315 and reduces the SEE from \$1.7765 to \$1.7110.

When race and sex are added, only the dummy variable for sex is significant probably because of the very small number of blacks in the subgroup sample. Equation (V) gives these final results.

(V)

$$\begin{aligned} w = &- 4.9651 + \underset{(7.72)}{.3120}\ \text{Schooling} - \underset{(1.90)}{.4037}\ \text{Migration} + \underset{(3.53)}{.0335}\ \text{Experience} \\ &+ \underset{(2.34)}{.5524}\ \text{SVP} - \underset{(2.05)}{1.4339}\ \%\text{FMOCC} + \underset{(2.99)}{15.3525}\ \text{After-tax Profit} \\ &- \underset{(3.98)}{1.3944}\ \text{Sex} \qquad \bar{R}^2 = .338 \qquad \text{SEE} = 1.6814 \end{aligned}$$

The coefficients on the human capital variables do not appreciably change after the addition of the dummy variable to the equation, but the coefficient on %FMOCC falls from -2.47 to -1.43 and concentration becomes insignificant. There is obviously a large wage differential associated with sex per se, yet the "crowding" factor still remains significant as does after-tax profits. Given racial and sexual differences in the labor force, stratification by occupation and industry plays some role in wage determination even at the top of the occupational hierarchy.

Again, further analysis of the regression results for individual occupation strata will be postponed until the next chapter.

CROSS OCCUPATION STRATA

The evidence presented up to this point indicates that within broad occupation groups, stratification and industry variables contribute to an explanation of existing wage differentials. In all cases these variables are of the proper sign, usually of large magnitude, and have relatively high t-values. Except in the case of the white male equation in OCC STRATUM 15-17, the addition of the non-human capital modules significantly boosts the coefficients of determination and reduces the standard errors of estimate. We can conclude that within most occupation strata, the general model of wage determination posited here is superior to any developed in the tradition of pure human capital or, for that matter, pure institutional theory.

But the more severe test of the relative merits of human capital, institutional, and stratification theory requires evidence across occupational strata. As we have mentioned, it can well be argued that the findings within strata do not ultimately test the theory since individuals invest in human capital ostensibly to move from one stratum to another. Testing the human capital theory within a single stratum is therefore biased in favor of the institutional and stratification hypotheses. This bias is eliminated by pooling the sample across occupation strata. The full impact of the human capital module can then be measured. Table 5.8 provides these regression results.

White Males - For the full-time white male workforce in the 1967 SEO sample, earnings averaged \$3.42 an hour with a standard deviation of \$1.60. Based on either a simple $\bar{R}^2$ test or based on the change in the standard error of the estimate, little additional variance appears to be explained by variables other than human capital factors. The complete equation including stratification, industry, and working condition components increases the $\bar{R}^2$ by only .033 and reduces the SEE only slightly.

Each of the human capital factors is statistically significant for white men with the exception of the vocational training variable. Each year of education is worth \$.20 in hourly earnings if the schooling was taken outside of the south. Southern education is valued at two cents less reflecting only a slight regional differential in the returns to schooling for the white male workforce as a whole. According to the rate of return methodology used throughout this study,

TABLE 5.8

REGRESSION EQUATIONS: ALL OCCUPATION STRATA BY RACE AND SEX

	White Male		Black Male		White Female		Black Female		Cross Race-Sex	
Constant	.1911	.3353	1.5519	1.0838	1.5963	1.6647	.9224	1.7209	.3113	1.0962
HUMAN CAPITAL MODULE										
Schooling	.2030	.1767	.0911	.0721	.0578	.0429	.0905	.0749	.1526	.1405
	(15.62)	(12.99)	(8.93)	(8.05)	(3.66)	(2.95)	(7.13)	(7.64)	(13.63)	(12.66)
School-South	-.0199	-.0160	-.0471	-.0315	-.0249	-.0182	.0311	-.0215	-.0260	-.0186
	(2.93)	(2.37)	(7.48)	(5.73)	(3.83)	(2.91)	(5.02)	(3.77)	(4.58)	(3.44)
Training	---	---	.2442	.2059	---	---	---	---	.2315	.1620
	---	---	(2.89)	(2.83)	---	---	---	---	(3.17)	(2.35)
Migration	-.2884	-.2861	-.3745	-.2738	---	---	-.2230	-.1634	-.3343	-.3037
	(4.24)	(4.28)	(6.72)	(5.65)	---	---	(3.66)	(2.94)	(6.01)	(5.83)
Experience	.0123	.0119	.0065	.0062	-.0095	---	---	---	.0059	.0065
	(3.97)	(3.90)	(2.41)	(2.03)	(2.89)	---	---	---	(2.19)	(2.50)
Specific Voc. Prep.	.1596	.1541	.0641	.0883	.0478	.0570	.0365*	.0468	.2076	.1222
	(8.67)	(8.42)	(3.93)	(6.22)	(2.00)	(2.37)	(1.66)	(2.35)	(13.22)	(6.79)
STRATIFICATION MODULE										
Union Member	---	.2460	---	.5452	---	.2814	---	.2850	---	.3760
	---	(2.00)	---	(10.46)	---	(3.88)	---	(4.97)	---	(3.90)
% Minority--Industry	---	-.5306	---	-.6746	---	-.5370	---	-1.0994	---	-1.0032
	---	(2.47)	---	(4.23)	---	(3.00)	---	(6.59)	---	(6.31)
% Minority--Occupation	---	---	---	---	---	---	---	---	---	-.9075
	---	---	---	---	---	---	---	---	---	(6.53)
% Black Male--Occupation	---	---	---	---	---	---	---	---	---	---
% White Female--Occupation	---	---	---	---	---	---	---	---	---	---
% Black Female--Occupation	---	---	---	---	---	---	---	---	---	---
INDUSTRY MODULE										
Concentration	---	.8599	---	---	---	---	---	.3171	---	.7196
	---	(5.61)	---	---	---	---	---	(2.64)	---	(5.38)
Union x Conc.	---	-.5671	---	---	---	---	---	---	---	-.6471
	---	(2.49)	---	---	---	---	---	---	---	(3.53)
After-tax Profit	---	6.3688	---	8.2545	---	5.9787	---	---	---	6.5506
	---	(3.26)	---	(5.76)	---	(2.96)	---	---	---	(3.82)
Capital/Labor Ratio	---	---	---	.0023	---	.0027	---	---	---	.0010
	---	---	---	(3.90)	---	(3.02)	---	---	---	(2.00)
Government Demand	---	---	---	1.0711	---	2.2590	---	---	---	.9123
	---	---	---	(3.99)	---	(2.90)	---	---	---	(2.22)
WORKING CONDITIONS MODULE										
Physical Demands	---	-.1340	---	---	---	-.2323	---	-.1436	---	-.1263
	---	(3.16)	---	---	---	(4.79)	---	(3.27)	---	(3.26)
Negative Work Traits	---	---	---	---	---	---	---	---	---	---
R^2	.223	.256	.207	.421	.048	.155	.291	.431	.238	.333
SEE	1.4142	1.3862	.8117	.6953	.9659	.9136	.5644	.5074	1.3270	1.2439
MEAN	$3.42	$3.42	$2.37	$2.37	$2.05	$2.05	$1.66	$1.66	$2.96	$2.96
N	1850	1850	912	912	932	932	397	397	2394	2394

the average white male worker reaps a 5-1/2 percent return by remaining in school for an additional year (at the mean). This clearly exceeds the rate of return earned by each of the minority groups in the labor force; it is double the rate for black men and more than four times the rate earned by white women.[24] At least in relative terms, additional education is a good investment for white men, a finding consistent with virtually all human capital studies.

Migration, experience, and on-the-job training also play important parts in the wage determination process. Non-migrants earn, on average, $.29 less per hour than those who have moved at least fifty miles from their place of residence at age 16. This is equivalent to almost $600 per year for a full-time worker. Each year of labor force experience adds another 1.23 cents an hour to the wage rate. In annual terms this implies a $246 differential between the earnings of a fifteen year labor force veteran and a worker who has been out of school for only five years. Finally each unit of specific vocational preparation is worth $.16 per hour. Given the full range of this variable, there is a $1.44 difference in earnings between a worker in an occupation which requires only a short demonstration period and a worker whose occupation requires at least 10 years of on-the-job apprenticeship. On an annual basis the impact of SVP has a range of $2,880.[25]

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[24] The actual figures for the four race-sex groups are: white men 5.5%, black men 2.75%, white women 1.25%, and black women 4.75%. These relative rates of return are consistent with apriori theory and are further explored in the text.

While the other exogenous factor modules add only slightly to an explanation of the variance, six of the variables in these modules are statistically significant. Union membership and concentration interact in the now familiar manner.

	Concentration (MPF)		
	20%	60%	
No union	$3.24	$3.59	+10.8%
Union	3.37	3.49	+ 3.6%
	+4.0%	-2.8%	+ 7.7%

These results indicate that union membership has only a marginal impact on relative wages in both competitive and concentrated industries, a conclusion departing from many institutional analyses and roughly consistent with Weiss's results. In a similar regression, Weiss found that unionization increased earnings by at most 6-8 percent for a comparable group of workers.[26]

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[25] One example will serve to indicate the magnitude of the potential wage differential based on these regression results. A white male high school drop-out with ten years of schooling who never migrated, has worked in the labor force for five years and is presently employed in an occupation which requires only a short demonstration to learn its basic skills will earn, on average, $2.15 an hour. Alternatively, a college graduate who has migrated, has 15 years of labor force experience and is presently in a job requiring between one and two years of on-the-job training will earn $4.58 per hour. This is equal to a $2.43 wage differential, the college graduate earning 113 percent more than the high school drop-out.

[26] Weiss, op. cit., p. 108.

Concentration is more important in the present analysis. Weiss found a forty point increase in concentration increased earnings by only 3-5 percent. Here we find the increase to be as large as 10.8 percent in the non-union sector. Again we attribute our finding to the better measure of concentration used in the present analysis. The weaker effect of concentration on earnings among organized workers implies that unions in the competitive industries have the ability to win wage contracts more in line with the pattern set in the oligopolistic sector while unorganized workers in the competitive sector do not have this opportunity.[27] Overall, a unionized worker in a concentrated industry earns 7.7 percent more than a similarly skilled non-union worker in the classically competitive sector of the economy.

Two other variables in the stratification and industry modules affect white male earnings. A $\pm 1\sigma$ difference in %MININD is valued at \$.16 an hour while a similar $\pm 1\sigma$ evaluation of after-tax profits implies a \$.22 differential. In both cases the effect is statistically significant, but relatively minor being only 4.6 percent and 6.4 percent of the mean wage. In addition to these variables, the physical demands factor has a significant negative sign. Heavier work apparently earns a lower wage after controlling for human capital characteristics and industry attachment. The coefficient on negative work traits is not significantly different from zero. In neither case is there an indication of a compensatory earnings effect.

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[27] The implication we draw from these results is thus at variance with the overall conclusions of Weiss. He writes, "The implication seems to be that firms in concentrated industries do pay their employees more, but that they get higher 'quality' labor in the bargain. The incomes won by unions for their members more clearly exceed what those workers would earn in their best alternative employments." To the extent that it is possible to differentiate between the effect of concentration and unionization, the present study appears to indicate that monopoly rents arise more from the product market structure of an industry than from the present of unionization. Weiss, p. 108.

Black Males - The regression results for black males are in sharp contrast to those we have just seen. The human capital module is responsible for less than half of the total explained variance in earnings with the addition of the stratification and industry factors reducing the standard error of the estimate considerably. The essential structure of the earnings generating functions have a significant racial component, as we shall see.

Every human capital factor in the black regression is significant. Schooling taken outside of the south adds $.09 per hour for every year completed. This is less than half of the increment afforded to comparable whites and amounts to a rate of return of less than 3 percent at the mean.[28] This low hourly increment and the low return are consistent with virtually all of the studies that have been made of the impact of formal schooling on black male earnings.[29] What is more, southern schooling is worth only half as much as schooling taken elsewhere, presumably reflecting the poorer quality of southern black schools. The discount for southern schooling is much greater for black than for white men suggesting that the quality difference in education between southern schools and all others may be primarily race-related. In the non-south, the relative dollar return to schooling between black and white men is (.0911/.2030)=.45. In the south, the equivalent ratio is .24.

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[28] The difference in the coefficient on schooling between the white male and black male equation is significant at considerably better than the .01 level according to the difference in means test. t'=6.77.

[29] See Hanoch, op. cit. and Bennett Harrison, op. cit. for two important studies in this regard.

Vocational training is also a significant factor in the black male earnings equation. This is the only group for which this is true implying that although institutional manpower programs do not appreciably affect the earnings of most workers, they do benefit black men. Enrollment in a training program is valued at $.24 an hour or somewhat in excess of 10 percent of the mean wage. Whether these programs actually increase "endogenous" productivity cannot be directly measured, of course. What the significant coefficient suggests may only be that black workers who have completed a training program are more likely to be hired for jobs that pay somewhat higher wages.

Migration is another powerful factor influencing wages for this group. For the black male workforce as a whole, migration is worth an average of $.37 an hour. No doubt much of this overall increment reflects the special beneficial effect of moving out of the south. The high rate of return attendent to southern emigration is most likely responsible for explaining the higher coefficient on "migration" compared to the parameter in the white male equation. Outside of the south, migration may fail to pay off as handsomely for blacks as it does for whites.[30]

Labor force experience increments earnings by $.0065 an hour per year. Each year in the labor force is consequently worth only about half the rate for white men implying a much flatter age-earnings profile. Finally each unit of on-the-job training (SVP) is worth $.06 an hour. This figure too is less than half the coefficient for white men. Part of this difference may be the result of unspecified non-linearities in the return to specific vocational preparation. Alternatively, the smaller coefficient indicates a real difference in the return to each unit of SVP.

Taken together the six human capital factors explain one-fifth of the variance in earnings among full-time black male workers. The addition of the three remaining modules increases the coefficient of determination to .421. Union membership is extremely powerful in the complete equation. The nearly $.55 wage differential between union and non-union workers represents an average union wage which is 25.7 percent greater than that received by the average non-union worker. Obviously exclusion from a trade union has a massive impact on the earnings of a black male worker. While not a particularly important factor for white men, unionization represents a most important route to higher pay for the black male workforce. This is consistent with both institutional and stratification hypotheses. The percent of minority employment in an industry (%MININD) also affects the earnings distribution for this group of workers. A ±1σ difference in %MININD is valued at $.22 an hour, just slightly higher than the effect on white male earnings.

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[30] Evidence for this statement can be found in Barry Bluestone, William Murphy, and Mary Stevenson, Low Wages and the Working Poor (Ann Arbor: Institute of Labor and Industrial Relations, University of Michigan-Wayne State University, 1973), p. 127. Regarding black males,

> "Mobility out of other regions of the nation (other than the south) does not pay as handsomely. Across all education groups, moving out of the Northeast is only slightly beneficial for those who move to the North Central states or to the West. All other moves actually increase the probability of poor paying jobs."

The industry module in the final equation has a structure which is basically different from that of white men. Neither concentration nor the interaction term are reported in the final equation, although in test runs concentration (but not the interaction term) was extremely significant and powerful. It was necessary to drop concentration from the final equation because its addition always destroyed the integrity of one of the human capital factors. All of the regressions which were prepared with concentration as one of the exogenous variables failed to include "experience" as a statistically significant human capital factor. It was impossible to pin down the reason for this deteriorating effect on the "experience" coefficient.

As a substitute for concentration, other industry variables were significant in the complete equation without harming the human capital module coefficients. These included the highly colinear after-tax profit rate. The ±1σ evaluation of this variable is worth $.32 an hour. Similar ±1σ evaluations of the capital/labor ratio and the government expenditure variables are worth $.18 and $.20

respectively.[31] Each of these effects taken independently have more than a minor impact on the distribution of earnings. To the extent that these effects are additive, the industry module is quite powerful. The case for "complex" crowding is convincing while the human capital explanation leaves much to be desired.

The actual importance of human capital in explaining the existing wage differential between white and black men can be quantified by using the information generated in the regressions. The average wage for black male workers in 1967 was $2.37 or 69 percent of the average white male rate. The standard deviation was $.91.[32]

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[31] These three industry factors make perfect "quasi-"instrumental variables. They are colinear with concentration but not with variables in the human capital module. The partial (X^tX) matrix for the relevant factors is reproduced below.

Partial (X^tX) Matrix for Black Males
Cross Occupation Equation

	Concentration	Schooling	Experience
After-tax Profit	.5470	.1464	-.0797
K/L Ratio	.3706	-.0614	.0758
Government Demand	.1352	.0383	.0069

[32] Variability in earnings in the sample white male population is considerably greater than in the black male group. The coefficient of variation (V) for whites is .4678 while only .3838 for the black male sample. Two factors might explain this difference. One is that the underlying black male population is more homogeneous in human capital and therefore more homogeneous in earnings. The other is that the labor market treats black men as though they were more homogeneous in human capital than they really are (i.e. employers disregard human capital differences or discount them). In the first case we would expect to find a greater V for the human capital characteristics of

If we substitute the black means into the white equation the hourly rate for black males rises to $2.58 or 75 percent of the white male mean. Furthermore if we substitute black male means for the human capital module, but white male means for the other modules, the black male wage rate increases to $2.73 or 80 percent of the WM average. Assuming that SVP is a stratification variable because it is acquired on the job after access to employment has been secured, the black male wage now rises to $2.97 an hour or 87 percent of the white male mean. In this certainly plausible case, factors other than human capital account for over 56 percent of the BM/WM differential and only 43 percent of the mean wage difference between white and black males is

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the white male group.

Empirically we find the opposite to be true. For each of the human capital variables with the exception of School-south, the V's for white and black men are generally equal or the coefficient is greater for black men.

	V_{wm}	V_{bm}	V_{wm}/V_{bm}
Earnings	.4678	.3838	1.2188
Schooling	.2773	.4011	.6913
School-South	1.7467	.8080	2.1617
Training	1.6995	2.5823	.6581
Migration	1.2046	1.1601	1.0383
Experience	.4344	.4220	1.0293
SVP	.3610	.4582	.7878

This implies that the labor market is less sensitive to differences in the endogenous productivity characteristics of the black male workforce. Larger relative variability in education, for instance, is not reflected in the variability in earnings. This does not necessarily imply that individual employers who hire blacks totally overlook differences in worker characteristics when choosing their employees. But it does provide another cogent piece of evidence that the labor market facing black workers is substantially restricted.

due to measured differences in causally prior human capital variables.[33] These results are summarized in Table 5.9.

TABLE 5.9

POTENTIAL WAGE RATES FOR BLACK MALE WORKERS UNDER VARYING ASSUMPTIONS ABOUT THEIR CHARACTERISTICS

$(WM_{\overline{wm}} = \$3.42)$ Assumptions	Wage	BM/WM Ratio
$BM_{\overline{bm}\,HC, Strat, Ind, WC}$	\$2.37	.69
$WM_{\overline{bm}\,HC, Strat, Ind, WC}$	2.58	.75
$WM^{\overline{bm}\,HC}_{\overline{wm}\,Strat, Ind, WC}$	2.73	.80
$WM^{\overline{bm}\,HC(-SVP)}_{\overline{wm}\,Strat, Ind, WC, SVP}$	2.97	.87

BM = Black male estimating equation
WM = White male estimating equation
$\overline{bm}$ = mean values for BM exogenous variables
$\overline{wm}$ = mean values for WM exogenous variables

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[33] The differential due to measured human capital factors is calculated from:

$$D_{HC} = \frac{WM_{\overline{wm}} - WM^{\overline{bm}\,HC(-SVP)}_{\overline{wm}\,Strat,\ Ind,\ WC,\ SVP}}{WM_{\overline{wm}} - BM_{\overline{bm}}}$$

White Females - The overall structure of the complete white female equation is somewhat similar to that for the black male workforce with two important exceptions. The first is that neither the human capital regression nor the complete equation are very good models of wage determination based on the coefficient of determination or the standard error of the estimate. The second exception is that the human capital equation contains neither training nor migration, both of which were significant variables in the black male regression. In addition the sign on the experience variable is negative.

The unaugmented human capital equation explains only 4.8 percent of the variance in white female earnings and each of the exogenous variables is relatively weak. A year of schooling in the non-south is worth less than $.06 an hour at the mean while a year of southern schooling is worth only $.03. In the non-south this is equivalent to a minuscule 1.25 percent rate of return on a year of education, the lowest for any race-sex group. Based on this evidence, schooling does not generally appear to be a very profitable investment for white women in terms of their own future earnings. Vocational training is not very profitable either. Although almost 11 percent of the sample had some form of institutional training, enrollment in such programs does not have a significant impact on earnings. As we have mentioned previously, according to our regressions, only black men earn more due to manpower programs. Migration plays no role either. This was not unexpected given the assumption that men migrate for economic reasons while working women generally follow their husbands rather than seek to maximize own earnings through geographical relocation.

When running the human capital variables alone, a negative sign is found on the experience variable implying that more experienced women earn less given equal years of schooling. As we noted earlier, this result may be illusory because of measurement error. Given the pattern of female labor force participation the "experience" variable does not accurately measure the number of years in the labor force. However if human capital "depreciates" with non-participation, it can be expected that a woman who returns to the labor market after a period of time out of the labor force will earn less than a woman who never left work. This could explain a flat or negative earnings profile with respect to the variable "experience" or, to be more accurate, age. In the complete equation, the coefficient on "experience" is not significantly different from zero indicating a flat "experience"-earnings profile after controlling for all other measured factors.

Specific vocational preparation is barely significant at the .05 level. Each unit of SVP adds less than five cents to earnings, an amount smaller than a third of that in the white male equation. Again the relative size of the female coefficient may be biased downward because of non-linearity in the variable. But this seems unlikely to explain such a large difference.[34]

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[34] Alternatively, the weaker earnings effect of on-the-job training found in the white female equation may reflect a significant interaction between this variable and other human capital factors. It can be hypothesized that each additional unit of SVP in combination with education or other human capital factors has a higher rate of

The addition of the three remaining modules increases the $\bar{R}^2$ to .155 and reduces the SEE by \$.06. As in the black male equation, inclusion of concentration only came at the expense of violating the proviso concerning the human capital module. Coefficients on both schooling and SVP fell significantly when concentration was added to the equation. Consequently other industry variables were used as quasi-instruments.

Both union membership and %MININD were significant in this equation. Union membership is valued at \$.28 an hour leaving organized workers earning 14.2 percent more than non-union employees. The dollar amount is approximately equal to that of white male workers but only about half that of black men. In addition the $\pm 1\sigma$ evaluation of %MININD has a value of \$.22 an hour around a mean of \$2.05. As in the black male equation, after-tax profits, the capital/labor ratio, and the government expenditures variable are all significant.

$\pm 1\sigma$ Evaluations

After-tax profit rate	\$.20
Capital/labor ratio	.19
Government demand	.18
"Additive" Total	\$.57

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return. Without some form of complementary investment, SVP alone is worth little.

Given the lower mean SVP for white women ($\overline{SVP}_{wm}$=5.28 vs. $\overline{SVP}_{wf}$=4.16) this could explain the difference in the coefficients. To test this we ran an interaction term including GED and SVP and another with schooling and SVP. Both variables were insignificant. The lower coefficient in the white female equation apparently either represents the effect of specification error or implies a significantly lower return to on-the-job training. The coefficients on SVP for the white male and white female equations are significantly different at better than the .01 level. (t'=3.96)

Finally the physical demands factor is significant, but once again negative. Physically demanding work is rewarded with lower wages, other things equal.

Compared with the other race-sex groups, relatively less of the variance in white female earnings is explained by the general model of wage determination. The use of interaction terms in the human capital module might have improved the fit, but experimentation with these variables proved fruitless. Apparently there are numerous other factors not taken into account in the model which have special relevance for white women.[35]

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[35] Conjecture leads us to believe that one set of factors determining earnings not taken into account in the general model relates to the importance of earnings for women in various types of households. Ceteris paribus, a woman's earnings may be inversely related to her family's ability to provide a sufficient income to keep the family at a "satisfactory" or target standard of living. Where the woman's earnings are an important portion of the family's total income, we might expect more intensive job search by the female in the household with earnings being the key argument in her utility function. Earnings may be a much less crucial factor in job choice in families with sufficient income from other household members or alternative sources. In this case, two women with equal endogenous productivities may earn significantly different wages.

Another set of factors that may be important in the earnings function for white women has to do with physical appearance and the production of "psychological" benefits to employers. According to Paddy Quick, women may be hired for other reasons than objectively measured productivity; they supply their bosses (and their customers) with a more or less pleasant social and psychological environment. The human capital characteristics measured in the present study may not capture the traits which are "productive" in this respect. With these factors missing, the general model fails to account for a large part of the variance in white female earnings. See Paddy Quick, "Women's Work," Review of Radical Political Economics, Vol. 4, No. 3, July 1972.

Although our equations leave a good deal of the variance in earnings unexplained, we can still estimate the impact of the human capital module on the wage differential between white women and men. This can be done as in the black male equation by varying assumptions about the mean values of the white female exogenous variables. The results indicate that human capital is an extremely inadequate explanation of the forty percent wage gap between white men and women.

Plugging all of the white female means into the earnings equation for white men increases the WF/WM ratio from .60 to .90. If we use the white male means in the stratification, industry, and working conditions modules and the white female human capital means, the ratio rises to .93. Finally if we assume that SVP is a stratification factor rather than a human capital variable and we evaluate the white male equation once again, we eliminate practically all of the difference in earnings between the two groups. Only .02/.40=5 percent of the differential is directly due to sex-related differences in schooling, training, migration, and "experience." Given the measurement of experience this may be a slight underestimate of the full impact of human capital, but the thrust of the result still stands even if we discount this variable by a large percentage. The huge wage difference between white men and women cannot be attributed to the latter's underinvestment in human capital. Crowding and other forms of labor market discrimination play a much more critical role, although other factors not included in the model may be most important.

TABLE 5.10

POTENTIAL WAGE RAGES FOR WHITE FEMALE WORKERS UNDER VARYING ASSUMPTIONS ABOUT THEIR CHARACTERISTICS

($WM_{\overline{wm}}$=\$3.42)

Assumptions	Wage	BM/WM Ratio
$WF_{\overline{wf}}$ HC, Strat, Ind, WC	\$2.05	.60
$WM_{\overline{wf}}$ HC, Strat, Ind, WC	3.09	.90
$WM^{\overline{wf}\ HC}_{\overline{wm}\ Strat,\ Ind,\ WC}$	3.18	.93
$WM^{\overline{wf}\ HC(-SVP)}_{\overline{wm}\ Strat,\ Ind,\ WC,\ SVP}$	3.36	.98

Black Females - Black women are by far the poorest paid members of the workforce. With an average wage of \$1.66 an hour in 1967, black women earned only 48.5 percent of the average wage for white men and 81 percent of that for white women. Unlike white women, however, the general model of wage determination is capable of explaining a good portion of the variance in their earnings. The human capital module alone is responsible for 29 percent of the variance and the complete equation has a corrected R^2 of .431, the highest among the four race-sex groups.

Schooling plays a much more important role for black women than it does for either of the other minority groups. This is primarily due to the impact of education on occupational mobility.[36] A year of additional schooling (at the mean) in the non-south yields a wage increment of \$.09 an hour; in the south, \$.06. This is more than fifty percent higher than for white women and equal to the wage increment for black men. Because of the extremely low opportunity cost of additional schooling, the rate of return for black women is only second to that of white men. A marginal year of schooling yields a 4-3/4 percent rate of return, only 3/4 of a percentage point behind the white male rate.

Neither institutional training nor experience are significant in this equation. But the coefficient on migration suggests southern emigration is useful for black women whether the main motive for relocation is directly economic or not. A black woman who relocates earns, on average, 14.2 percent more (\$.22) than a similar worker who never moved more than 50 miles from her childhood home.

Specific vocational preparation is not significant (even at the .05 level) in the human capital equation. After controlling for industry characteristics and union membership, however, SVP becomes significant at the .01 level with each unit of on-the-job training yielding approximately the same return as for white women (\$.047).

The addition of the three remaining modules increases the $\bar{R}^2$ to .431 and reduces the SEE to \$.507. In dollar terms, union membership is worth $.29 an hour, an amount equivalent to that for both white men and women. Because of lower average earnings, membership is valued at 18 percent, more than four times the value for white men and 27 percent more than for white women. Segmentation into minority-impacted industries is also much more important for black women than for any of the other groups. The ±1σ evaluation of %MININD is valued at $.38 an hour, almost twice the effect found elsewhere. This is fully consistent with other data which suggest that black women have historically been segregated into a very small number of industries and occupations, many of which are related to domestic and personal service. The one significant industry variable in the final equation is concentration; here the ±1σ evaluation is worth $.16 an hour. Together, union membership, %MININD, and concentration are worth $.83 an hour, exactly half of the mean wage rate.

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[36] For a more detailed analysis of this point, see Bluestone, Murphy, and Stevenson, op. cit.

Evaluating the white male equation at the black female means furnishes added evidence of the qualitative difference in the earnings functions between the two groups. When the white male equation is evaluated with all of the black female means, the wage ratio rises steeply from .485 to .75. In this case the higher wages for black women would be due to the higher gross returns on their human capital and the smaller impact of being assigned to minority dominated industries. (See Table 5.11)

If black women were to gain access to the same set of industries as white men the wage ratio would rise still further to .84. In this case, human capital differences would be responsible for .16(1-.485)=31 percent of the total wage differential. The other 69 percent would be due to differences in the structure of the earnings functions (varying gross returns) and differential access to industries and occupations. If we then assume that SVP is a stratification variable the difference in human capital endowments is left to explain only 16 percent of the total wage differential. This is a good deal more than for white women but substantially less than for black men.

TABLE 5.11

POTENTIAL WAGE RATES FOR BLACK FEMALE WORKERS UNDER VARYING ASSUMPTIONS ABOUT THEIR CHARACTERISTICS

Assumptions	($WM_{\bar{w}\bar{m}}$=\$3.42) Wage	BF/WM Ratio
$BF_{\bar{b}\bar{f}_{\text{HC, Strat, Ind, WC}}}$	\$1.66	.485
$WM_{\bar{b}\bar{f}_{\text{HC, Strat, Ind, WC}}}$	2.55	.75
$WM^{\bar{b}\bar{f}_{\text{HC}}}_{\bar{w}\bar{m}_{\text{Strat, Ind, WC}}}$	2.86	.84
$WM^{\bar{b}\bar{f}_{\text{HC(-SVP)}}}_{\bar{w}\bar{m}_{\text{Strat, Ind, WC, SVP}}}$	3.14	.92

All of the minority group results thus point overwhelmingly to the importance of factors other than human capital in explaining the large wage differentials between groups. Differences in schooling, institutional training, migration, and experience can explain only two-fifths of the differential between white and black males, only a sixth of the BF/WM differential and only a twentieth of the differential between white men and women. The remaining portion of the differential is due to a combination of stratification mechanisms: unionism, "crowding," and pure wage discrimination.

The relative unimportance of human capital differences may be due in part to the specification of the pooled regressions. The absence of a log linear dependent variable and interaction terms for education, experience, and training may be responsible for this result. But other investigations come to very similar conclusions as ours using different techniques and data sources. Blinder's study of wage discrimination using Michigan Survey Research Center data concludes that the amount of intergroup wage differentials which can be explained by differences in personal endowments is even smaller than that found in the present study.[37] For the male wage differential, Blinder concludes that only 30 percent can be attributed to differences in endowments while virtually none of the white male/female differential is due to these factors.[38] Using still different techniques, both Michelson and Siegel have also questioned the importance of human capital endowments in explaining white/black income differences.[39]

THE "GRAND" POOLED REGRESSIONS

The final three regressions reported in this chapter are for the total full-time full-year privately employed labor force. Even if somewhat imprecise due to their specifications, these equations do clarify the dimensions of "crowding." The numerous caveats regarding their interpretation have already been discussed.

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[37] Alan S. Blinder, "Wage Discrimination: Reduced Form and Structural Estimates," Journal of Human Resources, Fall 1973.

[38] Ibid., pp. 447, 449.

[39] See Stephan Michelson, Incomes of Racial Minorities (Washington: The Brookings Institution, 1968) unpublished manuscript; and Paul Siegel, "On the Cost of Being a Negro," Sociological Inquiry, Winter 1965.

When regressed alone the human capital module explains 24 percent of the variance in all earnings. A year of schooling is worth $.15 an hour ($.127 in the south) which translates into an average 4.5 percent rate of return on the foregone income opportunity cost of schooling. The training variable is significant with enrollment in an institutional vocational program worth over $.23 an hour. Migration is worth $.33 while each year of experience is valued at nearly 6/10 of a cent and each unit of SVP adds $.21 an hour. The mean wage for this 1967 composite sample is $2.96 with a standard deviation of $1.52.

Using this equation it is possible to estimate the range in earnings under different assumptions about schooling, SVP, training, and experience. For simplicity we assume throughout that schooling was taken outside the south ("school-south"=0) and that migration had been undertaken ("migration"=0). These results are reported in Table 5.12a-c along with the estimated earnings for each of the individual race-sex groups calculated from their own occupation-pooled regressions. The row W* in this table refers to the estimated wage for the "grand" pooled regression. All of the estimates are made from the human capital equations reported in Table 5.8. The four rows below the dollar estimates give the percentage differentials from the grand pooled wage for each of the race-sex groups. In all but a very few cases, white men have wages in excess of the grand pooled estimates while each of the

TABLE 5.12a

ESTIMATED HOURLY EARNINGS UNDER VARIOUS ASSUMPTIONS CONCERNING THE HUMAN CAPITAL MODULE IN THE OCCUPATION-POOLED REGRESSIONS: SCHOOL COMPLETED=8 YEARS

School Completed	8 Years							
SVP	2				6			
Training	No		Yes		No		Yes	
Experience	5	20	5	20	5	20	5	20
W^*	\$1.98	\$2.07	\$2.21	\$2.30	\$2.81	\$2.90	\$3.04	\$3.13
W_{wm}	2.20	2.38	2.20	2.38	2.84	3.02	2.84	3.02
W_{bm}	2.31	2.41	2.55	2.65	2.57	2.67	2.80	2.91
W_{wf}	2.15	2.15	2.15	2.15	2.34	2.34	2.34	2.34
W_{bf}	1.72	1.72	1.72	1.72	1.87	1.87	1.87	1.87
	%	%	%	%	%	%	%	%
$(W^*-W_{wm})/W^*$	+11.1	+15.0	- .5	+3.5	+1.1	+4.1	-6.6	-3.5
$(W^*-W_{bm})/W^*$	+16.7	+16.4	+15.4	+11.3	-8.5	-7.9	-7.9	-7.0
$(W^*-W_{wf})/W^*$	+8.6	+3.9	-2.7	-6.5	-16.7	-19.3	-23.0	-25.2
$(W^*-W_{bf})/W^*$	-13.1	-16.9	-22.2	-25.2	-33.5	-35.5	-38.5	-40.3

TABLE 5.12b

ESTIMATED HOURLY EARNINGS UNDER VARIOUS ASSUMPTIONS CONCERNING THE HUMAN CAPITAL MODULE IN THE OCCUPATION-POOLED REGRESSIONS: SCHOOL COMPLETED=12 YEARS

School Completed	12 Years							
SVP	2				6			
Training	No		Yes		No		Yes	
Experience	5	20	5	20	5	20	5	20
W*	\$2.59	\$2.68	\$2.82	\$2.91	\$3.42	\$3.51	\$3.65	\$3.74
W_{wm}	3.01	3.19	3.01	3.19	3.65	3.83	3.65	3.83
W_{bm}	2.67	2.77	2.91	3.01	2.93	3.03	3.16	3.27
W_{wf}	2.38	2.38	2.38	2.38	2.57	2.57	2.57	2.57
W_{bf}	2.08	2.08	2.08	2.08	2.23	2.23	2.23	2.23
	%	%	%	%	%	%	%	%
$(W^*-W_{wm})/W^*$	+16.2	+19.0	+6.7	+9.6	+6.7	+9.1	0.0	+2.4
$(W^*-W_{bm})/W^*$	+3.1	+3.4	+3.2	+3.4	-14.3	-13.7	-13.4	-12.6
$(W^*-W_{wf})/W^*$	-8.1	-11.2	-15.6	-18.2	-24.9	-26.8	-29.6	-31.3
$(W^*-W_{bf})/W^*$	-19.7	-22.4	-26.2	-28.5	-34.8	-36.5	-38.9	-40.4

TABLE 5.12c

ESTIMATED HOURLY EARNINGS UNDER VARIOUS ASSUMPTIONS
CONCERNING THE HUMAN CAPITAL MODULE IN THE
OCCUPATION-POOLED REGRESSIONS:
SCHOOL COMPLETED=16 YEARS

School Completed	16 Years							
SVP	2				6			
Training	No		Yes		No		Yes	
Experience	5	20	5	20	5	20	5	20
W^*	$3.20	$3.29	$3.43	$3.52	$4.03	$4.12	$4.26	$4.35
W_{wm}	3.82	4.00	3.82	4.00	4.46	4.64	4.46	4.64
W_{bm}	3.03	3.13	3.27	3.37	3.29	3.39	3.52	3.63
W_{wf}	2.61	2.61	2.61	2.61	2.80	2.80	2.80	2.80
W_{bf}	2.44	2.44	2.44	2.44	2.59	2.59	2.59	2.59
	%	%	%	%	%	%	%	%
$(W^*-W_{wm})/W^*$	+19.4	+21.6	+11.4	+13.6	+10.7	+12.6	+4.7	+6.7
$(W^*-W_{bm})/W^*$	-5.3	-4.9	-4.7	-4.3	-18.4	-17.7	-17.4	-16.6
$(W^*-W_{wf})/W^*$	-18.4	-20.7	-23.9	-25.9	-30.5	-32.0	-34.3	-35.6
$(W^*-W_{bf})/W^*$	-23.8	-25.8	-28.9	-31.3	-35.7	-37.1	-39.2	-40.5

minority groups falls below the respective grand means. Black males with 12 years or less of schooling and little on-the-job training comprise the one major exception to this rule. There is also a general trend for the wages of minority groups to fall further behind W* as the amount of SVP, training, and experience increases. This trend is less pronounced for increases in schooling. This all reflects the lower earnings elasticities (w.r.t. human capital) prevailing for minority groups in the economy.[40]

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[40] It is tempting to interpret the W* in Table 5.12a-c as the wage rates that would prevail for given human capital endowments in the absence of "crowding." But this interpretation is not correct except under extremely restrictive assumptions. For W* to be the perfectly competitive ("uncrowded") wage, (1) the underlying distribution of human capital must be identical for each of the subgroups and (2) the ratio of the slopes of the sectoral demand curves must be inversely proportional to the employment ratio in the previously segregated sectors. Proposition (1) is required in order for the grand pooled regression estimates of W* to equal the weighted mean wage estimates summed over the race-sex subgroups ($\bar{W}_{rs}$). Proposition (2) follows from the theory presented in Chapter III. The proof of this is straight-forward.

Let (1) $w_1 = a_1 - b_1E_1$

(2) $w_2 = a_2 - b_2E_2$

and (3) $W^* = \bar{W}_{rs} = (w_1E_1 + w_2E_2)/(E_1 + E_2)$

with the first equality in (3) holding only if the human capital distributions are identical.

If $w_1 = w_2$ in perfect competition, then from (1) and (2),

(4) $E_1 = (a_1 - a_2)/b_1 + (b_2/b_1)E_2$

If $a_1 = a_2$ equation (4) simplifies to the familiar inverse ratio

$$(E_1/E_2) = (b_2/b_1)$$

Substituting $E_1 = (b_2/b_1)E_2$ into (3) then yields

The addition of the three remaining modules boosts the $\bar{R}^2$ to .333 with a large number of significant variables. In the stratification module both %MININD and %MINOCC boast highly significant negative coefficients. The usual $\pm 1\sigma$ evaluations yield wage differentials of \$.38 and \$.50 respectively. Union membership interacts with concentration to render the following effect:

	Concentration		
	20%	60%	
No union	\$2.79	\$3.08	+10.4%
Union	3.04	3.07	+ 1.0%
	+9.0%	0.0%	+10.0%

In competitive industries, union members earn approximately 9 percent more than workers who do not belong to a trade union. But in the oligopolistic sector, union membership has no particular impact on relative earnings. It seems reasonable to believe that the small effect reflects the relative extent of trade unionism in different parts of the occupational hierarchy. With every few highly paid professionals and technicians in occupations with organized trade unions as usually defined, the cross occupation union variable tends to underestimate the impact of trade union membership in specific occupation

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$$W^* = [(b_2/b_1)w_1+w_2]/[(b_2/b_1)+1]$$

This reduces to $W^* = w_1 = w_2$ in perfect competition.

Without explicit knowledge of labor demand in each sector it is impossible to determine the wage impact of desegregation.

and industry groups. Indeed, if individuals who belong to professional organizations which behave like trade unions (e.g. the American Medical Association) were assigned a dummy value for membership it seems likely that the impact of the union variable would be much greater in these equations.

Concentration itself is relatively powerful in the non-union sector, but again in unionized industries greater concentration does not translate into additional higher earnings. Yet, overall, a union member in an oligopolistic industry earns 10 percent more than an unorganized worker in the competitive sector of the economy.

All of the other industry module variables are significant as well. The ±1σ evaluations of after-tax profits, the capital/labor ratio, and government demand are worth $.23, $.13, and $.12 respectively. Together they play a not insignificant role in explaining existing wage differentials even after controlling for the effect of concentration and union membership. Finally, the physical demands factor is significant but once more negative.

Adding the dummy variables for race and sex to this equation produces some further insights. While most of the coefficients on the human capital variables remain unaltered, the statistical integrity of "training" is compromised no matter when the dummy variable for sex is added. The simple correlation between sex and training is relatively small (-.145), but apparently multi-collinearity between several variables in the human capital module and sex is sufficient to produce this result.[41] No matter what the specific reason, however, there is enough other evidence to conclude that part of the explanation for lower earnings among women is the result of less vocational training.

---

[41] Investigation of step-wise regression results on the grand

(VI)

$$
\begin{aligned}
w = .8519 &+ \underset{(12.71)}{.1360}\ \text{School} - \underset{(2.81)}{.0146}\ \text{School-South} + \underset{(1.53)}{.1010}\ \text{Training*} \\
&- \underset{(5.50)}{.2750}\ \text{Migration} + \underset{(3.12)}{.0078}\ \text{Experience} + \underset{(7.41)}{.1296}\ \text{SVP} \\
&- \underset{(2.16)}{.3438}\ \text{\%MININD} + \underset{(.28)}{.0423}\ \text{\%MINOCC*} + \underset{(3.42)}{.3161}\ \text{Union Member} \\
&+ \underset{(6.03)}{.7738}\ \text{Concentration} - \underset{(3.47)}{.6090}\ \text{Union x Concentration} \\
&+ \underset{(4.09)}{6.7310}\ \text{After-tax profit rate} + \underset{(2.25)}{.0009}\ \text{Capital/Labor ratio} \\
&+ \underset{(2.71)}{1.0652}\ \text{Government Demand} - \underset{(3.72)}{.1389}\ \text{Physical Demands} \\
&- \underset{(3.20)}{.2920}\ \text{Race} - \underset{(14.29)}{1.0648}\ \text{Sex} \qquad \bar{R}^2 = .387 \qquad \text{SEE } 1.1922
\end{aligned}
$$

Over a quarter of the white male workers in the sample had some form of institutional training during their work careers. In contrast only 10 percent of the white women in the sample and 14 percent of the black women reported institutional training.

Of even greater apparent interest, addition of the dummy variables severely reduces the coefficient on the industry crowding variable and totally eliminates the significance of the proxy for occupational segregation. The coefficient on %MININD falls from -1.0032 to -.3438

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pooled equation indicates that the multicollinearity apparently arises between training, sex, and SVP. In an equation with just school and sex, training has an F-value of 9.07 if entered as the next variable in the regression. If training is to be added to an equation with school, sex, and SVP, the F-value for training (if entered) falls to 2.80, well below the F required for statistical significance.

while its t-value drops from over 6.3 to less than 2.2. Meanwhile the coefficient on %MINOCC declines from -.9075 with a t-statistic in excess of 6.5 to +.0423 with a paltry t of .28. At first glance this suggests the near total absence of "crowding" after controlling for "pure discrimination."

Combined with other information, however, this conclusion seems to be much more tenuous. Evidence from the (X^tX) matrix for the "grand" pooled regression combined with the highly significant coefficients on %MININD in virtually every one of the individual race-sex equations strongly hint that (1) industry and occupational crowding is widespread and that (2) workers in minority-crowded industries are paid less regardless of race and sex.

TABLE 5.13

PARTIAL (X^tX) MATRIX FOR "GRAND" POOLED REGRESSION

	Race	Sex	%MININD	%MINOCC
Race	1.000	.006	.034	.051
Sex		1.000	.470	.637
%MININD			1.000	.389
%MINOCC				1.000

The complete elimination of %MINOCC from the final equation is most likely the result of collinearity with the better measured variable for sex. In effect occupational "crowding" appears to be so complete that it is impossible to independently measure its earnings effect. While there is then no definitive proof for the contention that "crowding" bears much of the responsibility for the large wage differentials found after controlling for human capital, the mass of evidence points strongly in this direction. This conclusion is reinforced by our previous findings of a significant coefficient on %MININD in a large majority of the individual equations, particularly in the lower occupation strata. Table 5.14 summarizes all of the %MININD results. If the bulk of these had been insignificant, we would have been much more hesitant to conclude that crowding plays a critical role in wage determination.

TABLE 5.14

SUMMARY OF SIGNIFICANT %MININD FACTORS
(t-values in parentheses)

Race-Sex Group	1-3	5	6-9	12-14	15-17	Total
WM	-2.0851	- .8005		- .7850		- .5306
	(4.85)	(2.91)		(3.18)		(2.47)
BM	- .7213	- .5723		- .8673	na	- .6746
	(2.86)	(2.34)		(2.14)		(4.23)
WF	- .8593					- .5370
	(2.97)					(3.00)
BF	-1.4104	- .5404		na	na	-1.0994
	(4.21)	(1.96)				(6.59)
Cross	-1.1829	-1.1728	-1.2192	-1.0525		-1.0032
	(4.03)	(6.22)	(4.37)	(5.25)		(6.31)
Cross w/R,S	-1.0019	- .4138	- .7200	- .8550		- .3438
	(3.51)	(2.13)	(2.90)	(4.29)		(2.16)

Beyond this, the addition of the race and sex dummies to the "grand pooled" regression strengthens the impact of the demand side variables. Coefficients on concentration, after-tax profits, and government demand increase after the dummies are added and the negative coefficient on the union-concentration interaction term declines.

Finally we note that addition of the race and sex variables raises the $\bar{R}^2$ to .387, over 60 percent more than the coefficient of determination for the human capital equation alone. Clearly then, human capital is an important element in wage determination for the whole labor force, but the story is much more complicated than all that. This we shall see even more clearly in the next chapter.

CHAPTER VI

AN EVALUATION OF THE REGRESSION RESULTS

In the previous chapter we reported all of the regression results and presented a preliminary analysis of each of the significant variables. This analysis demonstrated the significance of institutional and stratification factors in the determination of earnings and provided substantial although not incontrovertible evidence of the earnings impact of industry and occupational segregation. The present chapter extends this analysis by estimating the overall magnitude of earnings differentials for (a) workers who share the _same human capital_ but differ in industry and occupational attributes and (b) workers who _differ in human capital_ but work in similar industries and occupations. Instead of using an _ad seriatum_ analysis of variables as in the former chapter, the present evaluation considers the variables in each module as a unit (or _ad conjunctum_). In this way the combined impact of labor supply restrictions can be measured as well as the combined effect of the demand-side of the market. The results confirm the significance of non-human capital factors for virtually all members of the labor force and especially for minorities and all those on the lower rungs of the skill hierarchy. As in the previous chapter, each race-sex group is separately analyzed concluding with an investigation of the total labor force.

The Methodology

There are a number of methods that could have been used to estimate the relative strength of human capital and non-human capital factors as determinants of personal earnings. A brief review of some of these and the reasons for discarding the traditional ones serves to introduce the multivariate method finally chosen for this purpose.

The simplest method is probably an R^2 comparison or F-test. Given the nature of the regression procedure it is easy to measure how much additional variance in earnings can be explained by the inclusion of the stratification and industry variables. But it is not really the explained variance we are after. Instead we are seeking an indication of the size of potential wage differentials associated with the non-human capital factors. An R^2 comparison or F-test says nothing about this and therefore is inappropriate.

The traditional elasticity measure used in most economic analysis is somewhat more appropriate, but it too has a number of problems which cause us to reject it in this case. For one thing, point elasticities may tell very little about the relationship between a particular pair of factors when evaluated at points other than the mean. Constant elasticity measures can surely be calculated, but they may bear little resemblance to the real relationship between variables when evaluated near the tails of the distribution. While this is a relatively weak argument against the use of elasticity measures, there are additional arguments which are more cogent.

It makes sense to compare price elasticities for various goods or for various factors of production because the unit of analysis is the same throughout. But comparison of a "wage/concentration" elasticity with "wage/profit" or "wage/education" elasticities does not have the same appeal because of the very different units used to measure the exogenous factors. Comparing the price elasticities of apples and oranges has a common sense interpretation, but not so for a comparison of the earnings effect of years of education and after-tax profits.

A not unrelated problem arises from the non-marginal nature of variation in the exogenous factors used in this study. Infinitesimally small differences in human capital or industry and occupation characteristics do not accurately characterize changes in these variables. Normally we are interested in the effect of an additional year of schooling--or even the attainment of a diploma or degree--not the impact, say, of a one percent increase in schooling past the eighth grade. The same can be said for concentration and other industry factors. For this reason, Weiss, for instance, uses given levels of unionization and concentration in evaluating his equations, not elasticities.[1] In the final analysis, what we are after is a measure of some range of earnings over some range of its determinants.

Such a range can be estimated by measuring continuous variables at arbitrary distances from their means and measuring dichotomous variables at zero and one (e.g. no-training/training). One convenient method is to evaluate individual variables at ± one standard deviation from their mean values as we did in the last chapter. For a normal distribution this yields a range over the middle 2/3 of the observations. For other than normal distributions, the range seldom includes less than 1/2 or more than 2/3 of all the observations, making this measure variable, but bounded. Such a measure, of course, does not cover the full range of a variable's distribution and therefore in most cases provides a somewhat conservative estimate of the potential total impact of a given exogenous factor.[2] In our desire to err on the conservative side if necessary, this is a satisfactory measure if only a single variable is to be evaluated.

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[1] See Weiss, "Concentration and Labor Earnings," op. cit.

But by its nature such a single variable measure cannot provide an unbiased estimate of the impact of a combination of factors analyzed _ad conjunctum_. For present purposes such a technique is required for ultimately we wish to estimate the earnings impact of employment in a given multivariate "economic environment"--defined by a combination of an industry's concentration, profitability, and say, capital-intensity or the combined effect of industry and occupational segregation. The _ad seriatum_ measure tends in almost all instances to give an upward biased estimate of the combined range and in fact may result in evaluation of the regression at points well outside of the data's regime. It may happen, for instance, that within all of the observations in a given occupation stratum, no single individual can be found in an industry which is simultaneously 1σ greater on each of the separate industry measures. In this case it is obviously improper to evaluate the equation by summing the ±1σ wage differentials.

---

[2] Recall Chapter V fn. 3 for an extended discussion of this evaluation technique.

To overcome this deficiency a multivariate measure was devised that accounts for the actual variation in the exogenous variables taken as a unit.[3] Use of this measure normally prevents an estimate of a wage differential larger than the data's full regime and virtually always smaller than the ad scriatum estimate. Consequently it tends to further restrict the measured wage range due to industry and occupation variables--once more yielding a conservative estimate of these factors. Separate unit estimates were made for the stratification and industry modules. In evaluating the equations for the impact of "complex crowding," the two estimates were then added together.[4]

The Z* Measure

The ad conjunctum measure used in this part of the analysis involves estimating the standard deviation of a linear combination of the continuous variables in a given module using the regression coefficients as scalars. The standard deviation thus derived will be known as Z*, not to be confused with z-transformations or other statistical parameters. A Z* range is calculated for each industry and stratification module based on the regression equations reported in the last chapter. The derivation of this multivariate measure is generally straight-forward.

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[3] I am indebted to Prof. Malcolm Cohen of the Institute of Labor and Industrial Relations, University of Michigan for suggesting this measure to me.

[4] This may lead to a slight upward bias in these estimates for precisely the same reason that we rejected the ad seriatum measure, but the opposite signs on the stratification and industry module variables precluded the use of a joint ad conjunctum technique.

Let a_i be the estimated regression coefficient where X_{ij} is the jth observation on the ith continuous variable. Z_j is then the jth linear combination of the X_i vectors.

$$\begin{array}{c} a_1X_{11} + a_2X_{21} + \ldots + a_mX_{m1} = Z_1 \\ a_1X_{12} + a_2X_{22} + \ldots + a_mX_{m2} = Z_2 \\ \vdots \\ a_1X_{1n} + a_2X_{2n} + \ldots + a_mX_{mn} = Z_n \end{array}$$

or in vector notation:

$$a_1X_1 + a_2X_2 + \ldots + a_mX_m = Z$$

From this set of linear combinations, the mean of Z_j $(=\bar{Z})$ can be calculated as well as its standard deviation Z*.

$$Z^* = \sqrt{\frac{\sum_{j=1}^{N} (Z_j-\bar{Z})^2}{N-1}}$$

The measure ±Z* then provides a direct reading of the range in the exogeneous variable due to the combined variation in the X_i's. In the present case, $\pm Z^*_S$ is the *ad conjunctum* measure for the effect of the stratification module (excluding the dichotomous variable, "union member") while $\pm Z^*_I$ is an analogous measure for the industry module. Intuitively, $-Z^*_S$ is the wage differential associated with an industry-occupation "environment" which has "one standard deviation" less minority employment. The estimate $+Z^*_I$ is the wage differential associated with a "permissive economic environment" assessed on the basis of such factors as concentration, after-tax profits, capital-intensity or government demand.

The superiority of this unit measure over the *ad seriatum* technique can be demonstrated, first by specific example and then more generally. It will be shown that the *ad seriatum* estimate is always biased upward except in the improbable case of perfect positive pairwise correlation between exogenous variables. The following simple but generalizable two-variable two-observation example demonstrates the bias in the *ad seriatum* measure and the corrected estimate generated by the Z* method.

Assume a regression has been generated for Y containing two observations and two dummy independent variables, X_1 and X_2.[5] In order to simplify the example, let the final regression have the form: $Y = .25X_1 + .25X_2 + c$. With this limited information we can compare the *ad seriatum* (Z') and *ad conjunctum* (Z*) evaluations of the X module under the assumption of a positive correlation between X_1 and X_2. In this case, the values of the two evaluation estimates will be identical (Z'=Z*).

---

[5] Obviously such a regression could not actually be generated

Ad Seriatum (Z')

$$\begin{array}{ccc} X_1 & & X_2 \\ .25\begin{pmatrix}0\\ \\1\end{pmatrix} & \div & .25\begin{pmatrix}0\\ \\1\end{pmatrix}\end{array}$$

$$Z' = .25\sigma_{X_1} + .25\sigma_{X_2}$$

$$= .1767 + .1767$$

$$Z' = \underline{.3535}$$

Ad Conjunctum (Z*)

$$\begin{array}{lll} X_1 & X_2 & Z \\ [(.25 \times 0) + & (.25 \times 0)] = & 0 \\ [(.25 \times 1) + & (.25 \times 1)] = & .50 \end{array}$$

$$Z^* = \underline{.3535}$$

In the opposite case where X_1 and X_2 are negatively correlated, the Z' and Z* evaluations are no longer equal, the former generating a value no different from the case of positive correlation, but the latter equal to zero.

Ad Seriatum (Z')

$$\begin{array}{ccc} X_1 & & X_2 \\ .25\begin{pmatrix}0\\ \\1\end{pmatrix} & + & .25\begin{pmatrix}1\\ \\0\end{pmatrix}\end{array}$$

$$Z' = .25\sigma_{X_1} + .25\sigma_{X_2}$$

$$= .1767 + .1767$$

$$Z' = \underline{.3535}$$

Ad Conjunctum (Z*)

$$\begin{array}{lll} X_1 & X_2 & Z \\ [(.25 \times 0) + & (.25 \times 1)] = & .25 \\ [(.25 \times 1) + & (.25 \times 0)] = & .25 \end{array}$$

$$Z^* = \underline{.0000}$$

---

because of its singularity.

In this case the "standard deviation" of the X module as measured by Z* is zero because of the perfect offsetting impacts of X_1 and X_2 (given identical regression coefficients). This is, of course, the correct estimate of the differential in Y due to the combined effect of the X_i, for any "gain" due to having the characteristic X_1 is simultaneously offset by an identical "loss" in Y due to the absence of X_2, and vice-versa. For the analysis at hand this would be similar to a situation where all industries with greater than average concentration had less than average profitability. Empirically the zero-order correlations for the industry and stratification variables are usually positive but far from unity. Consequently the Z* measure corrects for potential overestimates generated by the *ad seriatum* technique.

A more general demonstration of the properties of the Z* measure can be provided, again using two variables and two observations for expositional simplicity. What is to be proven is that:

(6.1) $$\lim_{\rho_{X_1X_2} \to +1} Z^* = Z'$$

(6.2) $$\lim_{\rho_{X_1X_2} \to -1} Z^* = 0$$

if $a_1 = a_2$ and where ρ is a zero-order correlation coefficient between independent variables

Define the ad seriatum measure in the usual fashion:

$$Z' = a_1\sigma_{X_1} + a_2\sigma_{X_2} \tag{6.3}$$

and let Z* be the standard deviation of the linear combination of independent vectors (Z). The derivation of Z* is straightforward.

$$\begin{aligned} a_1X_{11} + a_2X_{12} &= Z_1 \\ a_1X_{21} + a_2X_{22} &= Z_2 \end{aligned} \tag{6.4}$$

From (6.4) the mean of Z ($\bar{Z}$) equals:

$$\frac{a_1(X_{11} + X_{21}) + a_2(X_{12} + X_{22})}{2} = \frac{Z_1 + Z_2}{2} = \bar{Z}$$

Therefore,

$$a_1\bar{X}_1 + a_2\bar{X}_2 = \bar{Z} \tag{6.5}$$

The standard deviation of Z follows directly by definition:

$$\sigma_Z = Z^* = [\sum(Z_i - \bar{Z})^2/(N - 1)]^{1/2} \tag{6.6}$$

Solving for Z* in terms of X_1 and X_2 can be done by first solving for the squared deviations.

$$\begin{aligned} Z_1 - \bar{Z} &= a_1X_{11} + a_2X_{12} - a_1\bar{X} - a_2\bar{X}_2 \\ &= a_1(X_{11} - \bar{X}_1) + a_2(X_{12} - \bar{X}_2) \end{aligned} \tag{6.7}$$

Analogously,

(6.8) $$Z_2 - \bar{Z} = a_1(X_{21} - \bar{X}_1) + a_2(X_{22} - \bar{X}_2)$$

Then squaring both sides of (6.7) and (6.8) gives

(6.9) $$(Z_1-\bar{Z})^2 = a_1^2(X_{11}-\bar{X}_1)^2 + 2a_1a_2(X_{11}-\bar{X}_1)(X_{12}-\bar{X}_2) + a_2^2(X_{12}-\bar{X}_2)^2$$

and $$(Z_2-\bar{Z})^2 = a_1^2(X_{21}-\bar{X}_1)^2 + 2a_1a_2(X_{21}-\bar{X}_1)(X_{22}-\bar{X}_2) + a_2^2(X_{22}-\bar{X}_2)^2$$

And summing the squared deviations

(6.10) $$\begin{aligned}(Z_i-\bar{Z})^2 &= a_1^2[(X_{11}-\bar{X}_1)^2 + (X_{21}-\bar{X}_1)^2] \\ &+ 2a_1a_2[(X_{11}-\bar{X}_1)(X_{12}-\bar{X}_2) + (X_{21}-\bar{X}_1)(X_{22}-\bar{X}_2)] \\ &+ a_2^2[(X_{12}-\bar{X}_2) + (X_{22}-\bar{X}_2)^2]\end{aligned}$$

Finally dividing both sides by N-1 (=1) gives the variance in Z.

(6.11) $$Z^{*2} = a_1^2\sigma_{X_1}^2 + 2a_1a_2\text{cov}(X_1\ X_2) + a_2^2\sigma_{X_2}^2$$

Now for Z^{*2} to equal Z'^2, then

(6.12) $$\begin{aligned}a_1^2\sigma_{X_1}^2 + 2a_1a_2\text{cov}(X_1\ X_2) + a_2^2\sigma_{X_2}^2 &= (a_1\sigma_{X_1} + a_2\sigma_{X_2})^2 \\ &= a_1^2\sigma_{X_1}^2 + 2a_1a_2\sigma_{X_1}\sigma_{X_2} + a_2^2\sigma_{X_2}^2\end{aligned}$$

which simply reduces to

(6.13)
$$\operatorname{cov}(X_1\ X_2) = \sigma_{X_1}\sigma_{X_2}$$

Finally, dividing both sides by $\sqrt{\sigma^2_{X_1}\sigma^2_{X_2}}$ provides a proof of (6.1).

(6.14)
$$\frac{\operatorname{cov}(X_1\ X_2)}{\sqrt{\sigma^2_{X_1}\sigma^2_{X_2}}} = \rho_{X_1}X_2 = 1 \qquad \text{Q.E.D.}$$

To prove (6.2) divide both sides of (6.11) by $\sigma_{X_1}\sigma_{X_2}$ and set $a_1=a_2=a$. This gives

(6.15)
$$\frac{Z^{*2}}{\sigma_{X_1}\sigma_{X_2}} = \frac{a^2\sigma^2_{X_1}}{\sigma_{X_1}\sigma_{X_2}} + \frac{2a^2\operatorname{cov}(X_1\ X_2)}{\sigma_{X_1}\sigma_{X_2}} + \frac{a^2\sigma^2_{X_2}}{\sigma_{X_1}\sigma_{X_2}}$$

Then setting $\operatorname{cov}(X_1\ X_2)/(\sigma_{X_1}\sigma_{X_2}) = \rho_{X_1X_2} = -1$ and cancelling yields

(6.16)
$$\frac{Z^{*2}}{\sigma_{X_1}\sigma_{X_2}} = \frac{a^2\sigma_{X_1}}{\sigma_{X_2}} + \frac{a^2\sigma_{X_2}}{\sigma_{X_1}} - 2a^2$$

Remultiplying both sides of (6.16) by $\sigma_{X_1}\sigma_{X_2}$ yields:

$$(6.17) \qquad Z^{*2} = a^2\sigma^2_{X_1} - 2a^2\sigma_{X_1}\sigma_{X_2} + a^2\sigma^2_{X_2}$$

$$= (a\sigma_{X_1} - a\sigma_{X_2})^2$$

Finally, taking the square root of both sides leaves an expression for Z*

$$(6.18) \qquad Z^* = a\sigma_{X_1} - a\sigma_{X_2} = a(\sigma_{X_1} - \sigma_{X_2})$$

Thus when $\rho_{X_1X_2} = -1$, Z* = 0 if either of two conditions holds:

(1) $a_1=a_2=a=0$

or (2) $\sigma_{X_1} = \sigma_{X_2}$, when $a_1=a_2$ Q.E.D.

The first condition is trivial, showing only that the X module has no impact on Y when the regression coefficients on X_1 are insignificant. Condition (2) is more substantive, demonstrating that the impact of a given module is zero when there is identical variance in all of the exogenous factors and the variables are inverse correlates of each other. Thus the multivariate measure has the property of ranging from zero to Z' as the correlation between paired explanatory variables runs from negative to positive one. This is, of course, a desirable property for such a statistic.

The Results

In the actual estimates that follow, a Z* is calculated for the industry and stratification modules wherever there are two or more continuous variables in a given module. Otherwise the equivalent ad seriatum measure is used. Where the dichotomous variable, "union member" is significant in a regression, it is evaluated at zero and one and added linearly to the estimate of Z*. Consistent with the rationale for "simple" and "complex" crowding, the regression equations are evaluated at (a) the mean for all variables ($\bar{W}$), (b) then at the mean for all of the variables excluding the stratification factors which are evaluated at (±Z*±UN), and finally (c) at the mean for all of the variables excluding those in the stratification and industry modules both of which are evaluated according to the Z* formula. This final statistic then measures the overall range in earnings for a human capital constant population evaluated in terms of $\pm Z^*_S$, ±UN, and $\pm Z^*_I$. All of these range or interval estimates are based on the regression equations recorded in Chapter V. The tabular results that follow report hourly and annual earnings intervals as well as associated percentage differentials.[6,7] Each race-sex group

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[6] In terms of annual earnings, full-time full-year employment is assumed to be 52 weeks x 40 hours per week = 2080 hours/year.

[7] The two percentage earnings intervals are calculated in the following way:

$$(1) \quad \frac{(-Z^*_S + UN + Z^*_I) - (+Z^*_S - UN - Z^*_I)}{(+Z^*_S - UN - Z^*_I)} \quad \text{"COMPLEX"}$$

is reported separately and followed by the results for the labor force as a whole.

White Males - As expected, the narrowest wage differentials due to existing variation in non-human capital factors are found among white men. Nevertheless these differentials are far from inconsequential particularly in the lowest skill strata. (See Table 6.1) The results for occupation group 1-3, for instance, establish a perfect example of the "simple crowding" phenomenon. Holding human capital fixed, a full $1.00 an hour wage differential is found based on an evaluation of the STRAT factors alone. On an annual basis this amounts to an almost $2100 interval around a mean of $5637. The worker in a "permissive economic environment" (based on union membership and the degree of minority crowding) can expect on average to earn nearly 1-1/2 times (146%) the earnings of a similarly skilled non-union worker in a minority-crowded industry and over 17 percent more than the average wage in this stratum. In this particular case the comparison is between a union worker in an industry with 14 percent minority employment and an equally skilled but unorganized employee in an industry which has over 46 percent of its labor force composed of white women and blacks of both sexes. In other strata the differential is by no means as large, but still exists.

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(2) $$\frac{(-Z^{*}_{S} + UN) - (+Z^{*}_{S} - UN)}{(+Z^{*}_{S} - UN)}$$ "SIMPLE"

TABLE 6.1

WAGE INTERVALS DUE TO STRATIFICATION AND INDUSTRY FACTORS, BY OCCUPATION STRATUM WHITE MALES

Occupation	Deviations from $\bar{W}$			Total Earnings Interval[a]	
Stratum	W	Annual W	%	$	%
1-3					
$-Z^*_S + UN + Z^*_I$	$3.18	$6614	17.34%	$1.00	45.87%
$-Z^*_S + UN$	3.18	6614	17.34	1.00	45.87
$\bar{W}$	2.71	5637	--		
$+Z^*_S - UN$	2.18	4534	-19.55		
$+Z^*_S - UN - Z^*_I$	2.18	4534	-19.55		
5					
$-Z^*_S + UN + Z^*_I$	3.17	6594	10.45	.61	23.82
$-Z^*_S + UN$	2.98	6198	3.83	.23	8.36
$\bar{W}$	2.87	5970	--		
$+Z^*_S - UN$	2.75	5720	-3.83		
$+Z^*_S - UN - Z^*_I$	2.56	5325	-10.45		
6-9					
$-Z^*_S + UN + Z^*_I$	3.41	7093	15.20	1.00	41.49
$-Z^*_S + UN$	3.41	7093	15.20	1.00	41.49
$\bar{W}$	2.96	6157	--		
$+Z^*_S - UN$	2.41	5013	-18.58		
$+Z^*_S - UN - Z^*_I$	2.41	5013	-18.58		

TABLE 6.1 (Continued)

Occupation Stratum	Deviations from $\bar{W}$			Total Earnings Interval[a]	
	W	Annual W	%	$	%
12-14					
$-Z^*_S + UN + Z^*_I$	\$3.84	\$7987	9.71%	\$ .85	28.42%
$-Z^*_S + UN$	3.75	7800	7.14	.44	13.29
$\bar{W}$	3.50	7280	--		
$+Z^*_S - UN$	3.31	6885	-5.42		
$+Z^*_S - UN - Z^*_I$	2.99	6219	-14.57		
15-17					
$-Z^*_S + UN + Z^*_I$	5.11	10628	5.82	.56	12.40
$-Z^*_S + UN$	5.11	10628	5.82	.56	12.40
$\bar{W}$	4.83	10046	--		
$+Z^*_S - UN$	4.54	9443	-5.85		
$+Z^*_S - UN - Z^*_I$	4.54	9443	-5.85		
All Strata					
$-Z^*_S + UN + Z^*_I$	3.78	7862	10.52	.68	21.93
$-Z^*_S + UN$	3.52	7322	2.92	.16	4.76
$\bar{W}$	3.42	7114	--		
$+Z^*_S - UN$	3.36	6989	-1.75		
$+Z^*_S - UN - Z^*_I$	3.10	6448	-9.35		

[a] The first row of statistics reports the interval between $-Z^*_S + UN + Z^*_I$ and $+Z^*_S - UN - Z^*_I$

The second row reports the interval between $-Z^*_S + UN$ and $+Z^*_S - UN$

Occupation stratum 5, as one may recall, is comprised mostly of operative and kindred workers. The evidence clearly indicates that there is less variation in wages due to industry factors in these fairly homogeneous occupations. Yet differences in the extent of minority employment by industry and concentration account for a $.61 earnings wedge between equivalent workers. On an annual basis this amounts to a $1270 earnings gap or 24 percent. If we were to disregard differences in industry demand characteristics and only evaluate the regression for variance in the stratification module, the total wage range would be only $.23 or 8.36 percent. Much of the total wage differential is consequently explained by differences in industrial concentration given initial labor supply restrictions.

In occupation stratum 6-9, composed of many of the skilled trades, union membership plays the critical role in the distribution of earnings. Union membership alone is worth $.76 an hour (see Chapter V) out of a total wage differential of $1.00, the remaining gap due to the fact that apparently some white men are "trapped" in occupations crowded with black male workers. The $1.00 an hour amounts to a 41.5 percent earnings differential between workers of apparently equal endogenous productivity. The difference on an annual basis is $7093 vs. $5013.

A significant wage differential even prevails among white male workers in the relatively highly skilled occupation stratum 12-14. Here there is a $.44 earnings gap between workers who differ by $\pm Z^*_S$ and union affiliation and an additional $.41 due to differences in the industry module. Summed together this drives a 28 percent wedge between the annual earnings in a "permissive" vs. "repressive" economic environment.

Only for the very most skilled white male professional workers is the differential relatively unimportant. Here non-human capital factors are responsible for no more than a 12.5 percent wage gap between similarly qualified workers and the full extent of this range is apparently related solely to differences in industry profitability.

When we turn to evaluate the white male equation across all occupation strata, thus accounting for the full effect of human capital, we again find a relatively large wage differential due to stratification and industry factors, particularly the latter. Stratification factors (after controlling for the interaction between union membership and concentration) produce only a 4.76 percent wage differential. Once the Z^*_I is added, however, the total earnings gap rises to $.68 or nearly 22 percent. On an annual basis this amounts to a more than $1400 differential with earnings ranging from $3.10 an hour to $3.78. While these industry and stratification associated wage differentials are much smaller than for each of the minority groups, they are by no means insignificant and certainly too large to ig[illegible]e. The major unanswered question is how to explain them.

Where much of the earnings differentials between race-sex groups can be charged to discrimination in its many forms, this explanation is mostly useless for the dominant white male group. However, a number of possible alternative explanations can be ascertained. One hypothesis consistent with radical stratification theory maintains that wage differences among similarly qualified white men are due to unspecified variation in the workers' social class origins. Accordingly, higher wage workers have benefitted from being nurtured in an environment of financially and socially well-to-do families. Unfortunately we have not been able to control for this factor due to data limitations. Ultimately the social class hypothesis may explain some of the wage difference associated with industry and stratification factors, but at this point we have no proof.[8]

Another explanation might lie in compensatory wage payments which do not show up in the analysis of earnings or in fringe benefits that are inversely correlated with straight-time hourly wages. What evidence we have on compensatory payments seems to indicate just the opposite however. The physical demands variable in the white male cross strata equation is significant but negative. Little hard evidence exists on the fringe benefit question, but casual observation seems to indicate a probable positive correlation between wages and non-wage supplements.

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[8] What evidence does exist on this subject tends to deny the importance of social class as a determinant of the variance in income. In his study of Inequality, Christopher Jencks concludes that in fact most of the variation in men's incomes appears to be stochastic.

> "Neither family background, cognitive skill, educational attainment, nor occupational status explains much of the variation in men's incomes. Indeed, when we compare men who are identical in all these respects, we find only 12 to 15 percent less inequality than among random individuals."

Christopher Jencks, Inequality: A Reassessment of the Effect of Family and Schooling in America (New York: Harper & Row, 1972), p. 226.

A more plausible hypothesis relies on the existence of widespread imperfections in information about job opportunities. This of course makes a good deal of sense at least as an explanation of short-run wage differences. Such imperfections could well explain wage intervals of the magnitude found in the higher skill categories. Larger more permanent differentials, it would seem, require a more complex hypothesis.

One such possible hypothesis can be derived from a synthesis of theories based on the work of Thurow and Lucas[9] (the "job competition" thesis), Becker[10] and Oi[11] (the concept of labor as a "quasi-fixed" factor) and the institutionalists (the importance of "lock-in" effects in the supply of labor). According to the job competition thesis, individuals compete for jobs based on their background characteristics, not in terms of wage demands as standard neoclassical theory suggests. One can imagine a queue of jobs defined by a set of characteristics with the hourly wage rate being one of the defining parameters.[12]

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[9] Lester C. Thurow and Robert E.B. Lucas, The American Distribution of Income: A Structural Problem, A Study Prepared for the Joint Economic Committee of the U.S. Congress (Washington, D.C.: U.S. Government Printing Office, March 17, 1972), esp. pp. 19-39.

[10] Gary Becker, Human Capital, Chapter 11, op. cit.

[11] Walter Oi, "Labor as a Quasi-Fixed Factor," Journal of Political Economics, December 1962.

[12] One very difficult question is left unanswered by the job competition model: what determines the distribution of wages in the first place? If labor supply and demand factors are so weak as to leave the wage indeterminate, what other factors define the actual wage

Workers compete for these job/wage slots by presenting themselves in the job market to potential employers. Firms then choose employees on the basis of expected training costs (given their background characteristics), hiring first those with the lowest expected employment cost and then moving down the queue to higher cost labor if demand warrants.

If we apply this model over the business cycle, we can generate a pattern so that at any given point in time workers of identical endogenous productivity will be found in different job slots and thus earn various wage rates. This will occur as a worker who enters the job market during a period of tight demand will have a greater probability of finding a higher paying job while the worker who joins the market in a contractionary period may have to accept a lower paying job for the same amount of search effort. If search costs were low, the fixed cost of hiring and training labor were minimal, and there were no substantial "lock-in" effects, earnings differentials would only be temporary for lower wage workers would continually reenter the job market in an attempt to gain employment in the higher wage job slots consistent with their endogenous productivity. A strong tendency

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paid on a given job? One possible answer is that supply and demand are responsible for setting a wage range for every "job" but that custom and inertia--as well as institutional factors including union pressure--are responsible for setting and holding the wage distribution as it is. Once established the pattern of wages changes only slowly in response to real changes in supply and demand. For the most part the wage distribution is never in equilibrium accounting for a good deal of structural unemployment in all labor markets.

toward equal returns for identical personal characteristics would be the consequence.

In fact, however, labor is usually a "quasi-fixed" factor, search costs are often substantial, and "lock-in" effects are extensive. Specific training costs will often be shared by both the worker and the firm (with the shares depending on expected turnover and quit rates).[13] Once workers have invested in specific training in a particular slot, their marginal products and therefore their wages are presumably higher than in alternative employment. Consequently a worker will tend to remain in a job for which he has already paid for training rather than quit to begin a new job at a lower wage rate in hopes of working up to a higher one. Employers too will be reluctant to dismiss already trained employees so as to hire replacements even if the potential recruits embody superior background characteristics. Thus where labor has a high degree of "fixity," to use Oi's term, there will be a tendency for workers to stay where they are (and employers to keep them) even in the face of fairly substantial differences in hourly rates. This, of course, is fully consistent with individual utility functions which posit that workers attempt to maximize the expected value of lifetime income rather than simply maximize their wage.

The foregoing eclectic theory is obviously suggestive for the more skilled workforce, those in our sample with high SVP levels for instance. But the largest wage differentials due to other than human capital factors are found among the least skilled workers, presumably those with a low degree of "fixity." For them the "quasi-fixed" factor theory does not directly apply, but an institutional variant along the same theme does. Specific training and hiring costs produce one form of "lock-in" effect, where the more common mechanisms are seniority privileges and non-vested pensions, both of which apply to the full occupation spectrum, the lowest skill strata included. In attempting to maximize expected lifetime income a worker with many years of seniority and associated pension rights will not move to a job with a higher hourly wage rate if this means sacrificing the employment security which goes along with seniority (particularly in unionized firms) and the surrender of expected retirement income. In this case fairly large wage differentials will persist over time once the differentials exist at all.

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[13] See Becker, Human Capital, op. cit., pp. 21-22.

Unfortunately we do not have any data to test this hypothesis, but it seems a likely candidate to explain the substantial and probably persistent wage differences found among all but the most skilled white male workers. "Entrapment" through fixed training costs, imperfections in information, and non-vested seniority and pension privileges may very well be responsible for driving a wedge of as much as $2100 in annual earnings between white male workers who have substantially the same human capital attributes.

Black Males - Once we leave the realm of white male workers, the impact of industry and stratification factors becomes much more significant. This can readily be seen in an evaluation of the black male regressions. (See Table 6.2) In virtually every one of these, there is extensive evidence of "complex crowding" with union membership playing a consistently effective role in every stratum. The percentage earnings gap is as high as 75 percent (Occ Stratum 1-3) and the annual dollar difference, according to our evaluation technique, reaches almost $2800 (Occ Stratum 12-14).

Union membership and industry segregation are responsible for a 35 percent differential among black men in the lowest skilled occupation category. Adding the combined effect of differences in concentration and government demand raises the total differential to 75.8 percent or a $1.20 an hour range around a mean of only $2.17. The stratification and industry modules apparently contribute about equal weight to the overall wage gap. In occupation group 5 composed predominantly of operatives and janitors and sextons, the total earnings differential is of almost identical magnitude (74.9%), but nearly two-thirds of the total is due to stratification factors--mainly union membership--while the remainder is due to the single industry factor, concentration (see Chapter V). This is in sharp contrast to the white male regression for this stratum where we found only a small earnings differential (23.8%). Of this only a quarter was due to stratification factors and union membership apparently played no role at all. The rest of the relatively small $.61 differential was due to differences in concentration.

TABLE 6.2

WAGE INTERVALS DUE TO STRATIFICATION AND INDUSTRY FACTORS, BY OCCUPATION STRATUM BLACK MALES

Occupation Stratum	Deviations from $\bar{W}$			Total Earnings Interval	
	W	Annual W	%	$	%
1-3					
$-Z^*_S + UN + Z^*_I$	$2.78	$5782	28.11%	$1.20	75.80%
$-Z^*_S + UN$	2.51	5221	15.66	.65	34.94
$\bar{W}$	2.17	4514	--		
$+Z^*_S - UN$	1.86	3869	-14.28		
$+Z^*_S - UN - Z^*_I$	1.58	3286	-27.13		
5					
$-Z^*_S + UN + Z^*_I$	2.99	6219	25.10	1.28	74.85
$-Z^*_S + UN$	2.75	5720	15.06	.80	41.02
$\bar{W}$	2.39	4971	--		
$+Z^*_S - UN$	1.95	4056	-18.41		
$+Z^*_S - UN - Z^*_I$	1.71	3557	-28.45		
6-9					
$-Z^*_S + UN + Z^*_I$	2.87	5970	21.73	.95	49.23
$-Z^*_S + UN$	2.70	5616	14.40	.60	28.57
$\bar{W}$	2.36	4909	--		
$+Z^*_S - UN$	2.10	4368	-11.01		
$+Z^*_S - UN - Z^*_I$	1.92	3994	-18.43		

TABLE 6.2 (Continued)

Occupation Stratum	Deviations from $\bar{W}$ W	Annual W	%	Total Earnings Interval $	%
12-14					
$-Z^*_S + UN + Z^*_I$	$3.32	$6906	28.64%	$1.33	66.83%
$-Z^*_S + UN$	3.05	6344	17.76	.79	34.95
$\bar{W}$	2.59	5387	--		
$+Z^*_S - UN$	2.26	4701	-12.74		
$+Z^*_S - UN - Z^*_I$	1.99	4139	-23.16		
15-17					
$-Z^*_S + UN + Z^*_I$					
$-Z^*_S + UN$					
$\bar{W}$	SAMPLE SIZE TOO SMALL FOR SIGNIFICANT RESULTS				
$+Z^*_S - UN$					
$+Z^*_S - UN - Z^*_I$					
All Strata					
$-Z^*_S + UN + Z^*_I$	3.01	6261	27.00	1.15	61.82
$-Z^*_S + UN$	2.82	5866	18.98	.77	37.56
$\bar{W}$	2.37	4930	--		
$+Z^*_S - UN$	2.05	4264	-13.50		
$+Z^*_S - UN - Z^*_I$	1.86	3869	-21.51		

The total wage gap in occupation stratum 6-9 is smaller than in the other strata, a perplexing result at first glance. The full interval is 49.2 percent, not much greater than the differential for white men although still equivalent to almost $2000 on an annual basis. The relatively lower earnings gap is apparently related to weaker effects of both unionization and concentration but even more so to the virtual absence of any significant segregation factor. The perplexing result is made comprehensible once we recall that when segregation in a particular race-sex group is overwhelming, the true earnings differential may be empirically undetectable. The differential can only be uncovered by evaluating the pooled race-sex regressions.

Moving to the higher skilled occupation stratum 12-14, we find the percentage earnings range among black men to be more than double that of their white male counterparts and the dollar gap reaches a maximum for any group in any stratum ($1.33 an hour). About half the total differential is associated with the stratification module while the remaining half is due to differences in concentration. Based on the evaluation procedure, estimated hourly wages for this group span the interval $1.99 to $3.32. Unfortunately the data sample does not provide enough observations on professional black men to test whether the earnings differential substantially declines as for white men.

In turning to an examination of the cross occupation regression, one is immediately struck by the fact that the total percentage earnings differential is almost three times that for white men. The estimated range runs from $1.86 to $3.01 an hour compared with an estimated range of $3.10 to $3.78 for white males. Of the full $1.15 an hour wage spread due to stratification and industry factors, $.77 is due to the "supply side" with the remaining amount the effect of a linear combination of after-tax profits, capital/labor ratios, and government demand. The average black man in the full-time SEO sample earned $4930 on an annual basis, but given "average" human capital characteristics, the same worker could earn anywhere from an estimated $3869 to $6261 depending on how fortunate he was in finding employment in an industry characterized by a "permissive economic environment."

Much of this massive earnings differential may be explained by the same factors as we hypothesized for white men: compensating non-wage supplements, imperfections in labor market information, and lock-in or entrapment effects. But in addition to these there is considerable evidence of specifically race-linked segregation. The estimated STRAT module induced wage interval for the white male pooled regression is only $.16 an hour compared with the $.77 range estimated for black men. Part of this large difference is due to the much stronger impact of union membership on wage differentials while the remaining is due to the greater impact of the industry segregation factor %MININD.

White Females - The tale told in the evaluation of the white female regression results is a similar one, but even more difficult to uncover because of a much greater degree of occupational segregation. The estimated percentage differentials generally lie between those of comparable white and black men. (See Table 6.3) In the lowest skilled category, only the stratification module is significant but union membership as well as a linear combination of both occupation and industry segregation provide a 42 percent earnings interval with a dollar value of $.62 around a mean of $1.74. The total differential in occupation stratum 5 is somewhat larger (54.6%), but here the range seems to be better explained by differences in industry characteristics with the stratification module contributing only $.24 to a total $.87 differential. Union membership is the only significant STRAT factor in this regression.

Again as in the black male results, the earnings gap in occupation group 6-9 is lower than in any other stratum (with the exception of the professional group). The total gap is $.56 or 35.4 percent. A smaller coefficient on the union membership parameter seems to suggest the reason for this relatively narrow range in wages. But it is the smaller variance in this factor due to the underlying high degree of industry segregation that really explains this result.

This same effect is nowhere more evident than in the top two occupation categories where in both cases the regression coefficients in the stratification module are insignificant thus yielding a manifest earnings range of zero associated with these factors. The nearly 50 percent total wage differential in occupation stratum 12-14 appears to be solely due to an ad conjunctum analysis of after-tax profits and capital/labor ratios while the smaller 28 percent differential in

TABLE 6.3

WAGE INTERVALS DUE TO STRATIFICATION AND INDUSTRY FACTORS, BY OCCUPATION STRATUM WHITE FEMALES

Occupation Stratum	Deviations from $\bar{W}$			Total Earnings Interval	
	W	Annual W	%	$	%
1-3					
$-Z^*_S + UN + Z^*_I$	$2.11	$4389	21.22%	$ .62	41.54%
$-Z^*_S + UN$	2.11	4389	21.22	.62	41.54
$\bar{W}$	1.74	3619	--		
$+Z^*_S - UN$	1.44	2995	-14.36		
$+Z^*_S - UN - Z^*_I$	1.44	2995	-14.36		
5					
$-Z^*_S + UN + Z^*_I$	2.47	5138	22.69	.87	54.63
$-Z^*_S + UN$	2.15	4472	6.96	.24	12.56
$\bar{W}$	2.01	4181	--		
$+Z^*_S - UN$	1.91	3973	-5.00		
$+Z^*_S - UN - Z^*_I$	1.59	3307	-20.65		
6-9					
$-Z^*_S + UN + Z^*_I$	2.14	4451	16.30	.56	35.44
$-Z^*_S + UN$	2.03	4222	10.32	.34	20.11
$\bar{W}$	1.84	3827	--		
$+Z^*_S - UN$	1.69	3515	-8.15		
$+Z^*_S - UN - Z^*_I$	1.58	3286	-14.13		

TABLE 6.3 (Continued)

Occupation	Deviations from $\bar{W}$			Total Earnings Interval	
Stratum	W	Annual W	%	$	%
12-14					
$-Z^*_S + UN + Z^*_I$	$2.87	$5970	22.07%	$ .95	49.63%
$-Z^*_S + UN$	2.36	4909	--	--	--
$\bar{W}$	2.36	4909	--		
$+Z^*_S - UN$	2.36	4909	--		
$+Z^*_S - UN - Z^*_I$	1.92	3994	-18.42		
15-17					
$-Z^*_S + UN + Z^*_I$	3.18	6614	12.35	.70	28.22
$-Z^*_S + UN$	2.83	5886	--	--	--
$\bar{W}$	2.83	5886	--		
$+Z^*_S - UN$	2.83	5886	--		
$+Z^*_S - UN - Z^*_I$	2.48	5158	-12.38		
All Strata					
$-Z^*_S + UN + Z^*_I$	2.59	5387	26.01	.96	58.22
$-Z^*_S + UN$	2.36	4909	15.12	.49	26.20
$\bar{W}$	2.05	4264	--		
$+Z^*_S - UN$	1.87	3890	-8.78		
$+Z^*_S - UN - Z^*_I$	1.63	3390	-20.36		

the professionals category appears purely as the result of variance in concentration. Labor supply imperfections not specified in the regressions, such as those used to explain the white male wage differential, are probably responsible for permitting the labor demand variables to have such a significant impact on the estimated earnings gap. Again it should be noted that the smallest wage interval is among the professional class while large differentials permeate the rest of the occupation strata.

In turning to the cross occupation estimates, we find a total wage differential (in percentage terms) not significantly different from that of black men. In this case the total differential is equal to \$.96 an hour or 58.2 percent. A little less than half of this differential is associated with the STRAT module while the remainder is due, again as with black men, to a linear combination of after-tax profits, capital/labor ratios, and government demand. The overall wage interval runs from \$1.63, just barely above the 1967 prevailing minimum wage, to a high of \$2.59 an hour for women who gain access to industries or occupations characterized by a "permissive economic environment." In explaining these intra-group differentials we might rely on the same hypotheses we posited for white and black men and add the theory concerning different utility functions for women in different objective situations that we outlined in Chapter V.[14]

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[14] See Chapter V, fn. 35, p. 205.

Black Females - The extraordinarily large wage differentials found for black men are repeated for black women, with the exception that in occupation stratum 6-9 the earnings gap is even larger. (See Table 6.4) Being in a permissive economic environment can mean as much as $1.17 improvement over those who are not as fortunate, but given the very narrow range of opportunities for black women, even a "permissive economic environment" leaves virtually all of the workers in the first three occupation strata with estimated annual earnings below $5,000. In each of these cases, the largest part of the overall differential is due to stratification factors with union membership significant in every regression.

An evaluation of the pooled strata equation turns out to yield an earnings range which is almost identical in percentage terms to those found for the other two minority groups, although in this case a greater proportion of the total differential is associated with the stratification factors. Only concentration is significant in the industry module and at best variance in this measure adds $.15 to the $.82 differential. Table 6.5 demonstrates the near identical percentage differentials for the three minority groups. This striking similarity in the overall earnings differential is in sharp contrast to the much smaller interval associated with differences in industry and stratification factors for white men. Clearly the minority groups have something in common which they do not share with the dominant group in the labor force and it is far from their advantage.

TABLE 6.4

WAGE INTERVALS DUE TO STRATIFICATION AND INDUSTRY FACTORS, BY OCCUPATION STRATUM BLACK FEMALES

Occupation	Deviations from $\bar{W}$			Total Earnings Intervals	
Stratum	W	Annual W	%	$	%
1-3					
$-Z^*_S + UN + Z^*_I$	$1.79	$3723	31.95%	$ .75	72.47%
$-Z^*_S + UN$	1.71	3557	25.73	.58	51.32
$\bar{W}$	1.36	2829	--		
$+Z^*_S - UN$	1.13	2350	-16.91		
$+Z^*_S - UN - Z^*_I$	1.04	2163	-23.50		
5					
$-Z^*_S + UN + Z^*_I$	2.36	4909	26.88	.97	69.78
$-Z^*_S + UN$	2.21	4597	18.81	.68	44.44
$\bar{W}$	1.86	3869	--		
$+Z^*_S - UN$	1.53	3182	-17.74		
$+Z^*_S - UN - Z^*_I$	1.39	2891	-25.26		
6-9					
$-Z^*_S + UN + Z^*_I$	2.36	4909	37.20	1.17	98.31
$-Z^*_S + UN$	2.17	4514	26.16	.80	58.39
$\bar{W}$	1.72	3578	--		
$+Z^*_S - UN$	1.37	2850	-20.34		
$+Z^*_S - UN - Z^*_I$	1.19	2475	-30.81		

TABLE 6.4 (Continued)

Occupation Stratum	Deviations from $\bar{W}$			Total Earnings Intervals	
	W	Annual W	%	$	%
12-14					
$-Z^*_S + UN + Z^*_I$					
$-Z^*_S + UN$					
$\bar{W}$	SAMPLE SIZE TOO SMALE FOR SIGNIFICANT RESULTS				
$+Z^*_S - UN$					
$+Z^*_S - UN - Z^*_I$					
15-17					
$-Z^*_S + UN + Z^*_I$					
$-Z^*_S + UN$					
$\bar{W}$	SAMPLE SIZE TOO SMALL FOR SIGNIFICANT RESULTS				
$+Z^*_S - UN$					
$+Z^*_S - UN - Z^*_I$					
All Strata					
$-Z^*_S + UN + Z^*_I$	$2.12	$4410	27.71%	$ .82	63.07%
$-Z^*_S + UN$	2.05	4264	23.49	.67	48.55
$\bar{W}$	1.66	3453	--		
$+Z^*_S - UN$	1.38	2870	-16.86		
$+Z^*_S - UN - Z^*_I$	1.30	2704	-21.68		

TABLE 6.5

POOLED OCCUPATION REGRESSION WAGE INTERVAL ESTIMATES

Race-Sex Group	Dollar Differential	Percentage Differential
Black Males	$1.15	61.82%
White Females	.96	58.22
Black Females	.82	63.07
White Males	.68	21.93

Cross Race-Sex - The individual race-sex equations mask the effect of "crowding" as the extent of segregation rises beyond some point. Nowhere is this more true than among higher-skilled white females where occupational segregation is so extensive that the measured effect of the stratification module is zero. For this reason the pooled race-sex equations must be evaluated to correctly estimate the impact of the industry and stratification factors. The results confirm a significant earnings effect in every occupation stratum and for the labor force as a whole. (See Table 6.6)

This effect is by far the greatest in the low skilled occupations. The total estimated earnings range in occupation stratum 1-3 is a startling $3350 around an annual full-time mean of $4722. Workers in a "permissive economic environment" earn 35 percent more than the average wage for this group and more than twice (110%) the wage earned by those in overcrowded unorganized competitive industries. Minority segregation by industry and occupation, combined with union

TABLE 6.6

WAGE INTERVALS DUE TO STRATIFICATION AND
INDUSTRY FACTORS, BY OCCUPATION STRATUM
ALL RACE-SEX GROUPS

Occupation	Deviations from $\bar{W}$			Total Earnings Interval	
Stratum	W	Annual W	%	$	%
1-3					
$-Z^*_S + UN + Z^*_I$	\$3.07	\$6386	35.24%	\$1.61	110.27%
$-Z^*_S + UN$	2.97	6178	30.83	1.41	90.38
$\bar{W}$	2.27	4722	--		
$+Z^*_S - UN$	1.56	3245	-31.27		
$+Z^*_S - UN - Z^*_I$	1.46	3037	-35.68		
5					
$-Z^*_S + UN + Z^*_I$	3.08	6406	24.19	1.21	64.70
$-Z^*_S + UN$	2.85	5928	14.91	.75	35.71
$\bar{W}$	2.48	5158	--		
$+Z^*_S - UN$	2.10	4368	-15.32		
$+Z^*_S - UN - Z^*_I$	1.87	3890	-24.59		
6-9					
$-Z^*_S + UN + Z^*_I$	3.36	6988	29.23	1.54	84.61
$-Z^*_S + UN$	3.36	6988	29.23	1.54	84.61
$\bar{W}$	2.60	5408	--		
$+Z^*_S - UN$	1.82	3786	-30.00		
$+Z^*_S - UN - Z^*_I$	1.82	3786	-30.00		

TABLE 6.6 (Continued)

Occupation Stratum	Deviations from $\bar{W}$			Total Earnings Interval	
	W	Annual W	%	$	%
12-14					
$-Z^*_S + UN + Z^*_I$	$3.90	$8112	18.54%	$1.13	40.79%
$-Z^*_S + UN$	3.58	7446	8.81	.50	16.23
$\bar{W}$	3.29	6843	--		
$+Z^*_S - UN$	3.08	6406	-6.38		
$+Z^*_S - UN - Z^*_I$	2.77	5762	-15.80		
15-17					
$-Z^*_S + UN + Z^*_I$	5.35	11128	15.55	1.43	36.47
$-Z^*_S + UN$	5.01	10420	8.20	.76	17.88
$\bar{W}$	4.63	9630	--		
$+Z^*_S - UN$	4.25	8840	-8.20		
$+Z^*_S - UN - Z^*_I$	3.92	8154	-15.55		
All Strata					
$-Z^*_S + UN + Z^*_I$	3.67	7634	23.98	1.37	59.56
$-Z^*_S + UN$	3.42	7114	15.54	.86	33.59
$\bar{W}$	2.96	6157	--		
$+Z^*_S - UN$	2.56	5325	-13.51		
$+Z^*_S - UN - Z^*_I$	2.30	4784	-22.29		

membership, is responsible for a $1.41 earnings differential while concentration adds another twenty cents to the overall range. In annual terms the wage interval runs from $3037 to $6386 with human capital evaluated at the occ group means. The overall 110.27 percent wage interval compares with 72-76 percent intervals for black males and females and 42-46 percent for white men and women suggesting a strong racial and sexual component in the industry and occupation distribution of low-skilled workers.

In occupation stratum 5 this "discrimination" component appears less pronounced as the pooled percentage earnings differential falls within the range of the separate estimates for each race-sex group. Overall there is a $1.21 wage interval around a mean of $2.48. A little more than half (35.7%) of the total interval (64.7%) is produced by the STRAT module while the remaining is due to a linear combination of concentration, after-tax profits, and capital/labor ratios. On an annual basis the estimated interval is more than $2500 running from $3890 to $6406.

Turning to occupation stratum 6-9 we once again find an indication of the massive effect of industry and occupational discrimination. In none of the individual race-sex equations were any of the industry and occupation segregation variables significant (with the exception of union membership). But in the pooled regression three of these factors are significant and powerful. Analyzed ad conjunctum, %MININD, %MINOCC, and %BMOCC plus union membership are responsible for an 85 percent earnings differential. Of this total range, unionization is responsible for a little less than half ($.67) while the other three crowding variables make up the remainder of the $1.54 interval. After controlling for these factors, differences in industry structure have no additional effect on the wage range suggesting "simple" but substantial crowding.

In the two higher skilled strata as well there is evidence of sizable wage differences associated with the industry and stratification factors. There is a $1.13 wage gap (41%) in occupation group 12-14 with an interval of $.50 associated with union membership combined with a Z* evaluation of %MININD and %MINOCC. The remaining $.63 is due to a linear combination of two industry variables: concentration and after-tax profits. Even among professionals there is a 36.5 percent differential or an almost $3,000 annual salary interval after controlling for human capital characteristics.[15] This is primarily due to the sex-linked segmentation of the professional labor market. About half of the interval in this stratum is due to the single stratification variable %FMOCC while the remaining amount is associated once again with a linear combination of concentration and after-tax profits.

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[15] As has been the case throughout, we have evaluated these equations assuming that SVP is a true human capital component, not a function of industry or occupation segregation. Of course if we were to interpret SVP as a stratification variable--for which there is a good deal of justification--the wage interval would be much larger in a number of these equations including the present one. Later when we evaluate the effect of human capital, we shall assign the whole weight of the SVP factor to this module, surely an overestimate of the pure human capital effect.

Finally we come to the "grand pooled" regression for the whole labor force. Here we find for a human capital constant population a total range of $1.37 an hour or $2,850 a year on a full-time basis. This amounts to a 60 percent earnings differential between workers in a "permissive economic environment" and those, who for one reason or another, are consigned to industries which are on the "periphery" of the American industrial structure--industries which are non-unionized, impacted with minority groups, low profit, labor intensive, competitive, and lacking support in the form of government contracts.[16] A little more than half (33.6%) of the total interval is associated with labor supply restrictions while the rest is due to differences in industrial characteristics.[17] Such large differences

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[16] See Robert Averitt, *The Dual Economy: The Dynamics of American Industry Structure* (New York: W.W. Norton & Co., 1968), esp. Ch. 5.

[17] We should emphasize again that these are conservative estimates because of our evaluation technique. If we were to estimate the wage interval over the *total* range of the exogenous variables rather than at ±1σ around their means, or if we were to use an *ad seriatum* measure of the interval, we would find a much larger earnings range due to the industry and stratification factors. Evaluating the "grand pooled" regression *ad seriatum* rather than *ad conjunctum* increases the total wage interval to $1.71 and the percentage differential to 83.5 percent. Instead of an annual income spread estimated at $2,850, the *ad seriatum* interval is $3,550, twenty-five percent larger. The correlation matrices for the relevant variables indicate the reason for the lower *ad conjunctum* estimate.

The zero-order correlation between %MININD and %MINOCC in the stratification module is .3887. The industry module correlation matrix has the following values:

	Concentrtn.	Aft/Tx Pr.	K/L Ratio	Gov't Demand
Concentration	1.0000	.3320	.4531	.0997
After-tax profits		1.0000	-.0372	-.0092
K/L			1.0000	.0533
Gov't Demand				1.0000

due to factors other than measured human capital surely calls into question Leonard Weiss's conclusion--and the assumption of most human capital theorists--that "The general picture is one of fairly efficiently working labor markets, even where substantial monopoly may exist."[18] What we have found in this extensive analysis is significant evidence of widespread mismatching between endogenous productivities and marginal products. Workers with substantially the same human capital attributes earn substantially different wages, much of this apparently related to industry and occupation "crowding" with variations in industrial structure and performance adding to the overall wage dispersion. The personal earnings distribution, we have shown, is to a far-reaching extent a function of institutional factors well beyond the purview, let alone control, of the individual worker.

The Relative Impact of Human Capital and Non-human Capital Factors

Before bringing this analysis to a close, there is one additional question that warrants our attention. We have estimated the earnings differentials associated with industry and stratification factors, but not those which are due to variation in human capital. How large are these in absolute terms and relative to the size of the Z_S^* and Z_I^* intervals?

To evaluate the human capital variables, we have resorted to an ad seriatum measure so as to avoid as much as possible the potential error of underestimating the full impact of this module, again if anything biasing our overall estimates in favor of the human capital hypotheses. Each of the continuous human capital factors (schooling, experience, and SVP) were evaluated at ±1σ around their means while the dichotomous variables (migration and training) were evaluated at zero and one.[19] While the human capital factors were allowed to vary in this way, the values for the stratification, industry, and working conditions variables were set at their respective means. Two ad seriatum estimates were made: one for differences in schooling alone (ED-interval) and one for the complete human capital module (HC-interval). These were then compared with the earnings differentials associated with the industry and stratification factors (Z-interval) by computing the ratio of the Z-interval to each of the human capital ranges. The final numbers that result have no cardinal meaning, but can be compared in ordinal fashion. The results are found in Table 6.7.

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[18] Leonard Weiss, op. cit., p. 116.

The findings for white men are especially interesting. Although the ranking of the occupation strata is imperfect because of overlapping SVP scores, there still is a general ordinal trend in the skill content of jobs as one moves from occupation group 1-3 to stratum 15-17. Occ group 6-9 is the one major exception to this ranking primarily because its SVP range is so broad (SVP=3.5-8.0). If we delete this

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[19] To simplify the analysis the evaluation was done only for workers whose education was received outside of the south (i.e. School-south = 0).

TABLE 6.7

Z/HC RATIOS BY OCCUPATION STRATA

	White Males				
Occupation Stratum	Z Interval	ED Interval[a]	HC Interval[b]	Z/ED	Z/HC
~~1-3~~	45.87%	13.84%	13.84%	3.31	3.31
5	23.82	21.83	28.61	1.09	.83
6-9	41.49	15.25	15.25	2.72	2.72
12-14	28.42	18.24	42.82	1.56	.66
15-17	12.40	42.62	114.86	.29	.11
All Strata	21.93	37.15	97.90	.59	.22
	Black Males				
1-3	75.80	20.84	55.32	3.64	1.37
5	74.85	15.01	26.06	4.99	2.87
6-9	49.23	16.08	35.21	3.06	1.40
12-14	66.83	14.74	50.58	4.53	1.32
15-17	na	na	na	na	na
All Strata	61.82	23.21	83.60	2.66	.74

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[a] The ED-interval is the earnings range expressed in percentage terms and estimated by evaluating each regression at mean values for every variable with the exception of education (years of school completed) which is evaluated at ±1σ around its mean.

[b] The HC-interval is estimated _ad seriatum_ with all non-human capital variables evaluated at their means and the human capital factors evaluated at ±1σ for continuous variables and zero and one for those that are dichotomous.

TABLE 6.7 (Continued)

	White Females				
Occupation Stratum	Z Interval	ED Interval	HC Interval	Z/ED	Z/HC
1-3	41.54%	15.53%	15.53%	2.67	2.67
5	54.63	11.58	11.58	4.72	4.72
6-9	35.44	--	--	--	--
12-14	49.63	19.26	39.11	2.58	1.27
15-17	28.22	59.71	59.71	.47	.47
All Strata	58.22	10.17	19.04	5.72	3.06
			Black Females		
1-3	72.47	23.24	52.60	3.12	1.38
5	69.78	30.35	51.44	2.30	1.36
6-9	98.31	16.71	16.71	5.88	5.88
12-14	na	na	na	na	na
15-17	na	na	na	na	na
All Strata	63.07	30.33	64.10	2.08	.98
			All Race-Sex Groups		
1-3	110.27	13.65	42.53	8.07	2.59
5	64.70	13.58	34.30	4.76	1.89
6-9	84.61	10.92	10.92	7.74	7.74
12-14	40.79	22.35	53.24	1.83	.77
15-17	36.47	44.57	110.20	.82	.33
All Strata	59.56	32.08	92.88	1.86	.64

special case, we find a monotonic increase in the size of the human capital interval as we move from the lowest skilled occupations to the professionals category. In occ stratum 1-3 the total HC-interval is a mere 13.8 percent while it reaches almost 115 in the 15-17 group. Roughly the opposite trend is seen in the earnings differentials associated with industry and stratification factors (Z-interval). The largest Z-interval is found in the lowest skilled category while the smallest is found among the professionals. Consequently there is a combined trend toward smaller Z/HC ratios as one moves to higher occupation strata. In the lower skill groups the largest differences in earnings are associated with differences in industry and occupational attachment while differences in human capital begin to play a relatively much more important role only on the higher rungs of the skill hierarchy. In the lowest skilled occupations the earnings interval due to non-human capital factors is more than three times as great as the range due to schooling, skill, and experience while among professionals the size of the Z-interval is only 1/10 that associated with human capital. Over all strata, those workers with 1σ more schooling, experience and SVP as well as geographical mobility earn almost double (97.9%) the annual salary of workers in similar industries who have 1σ less education, experience, and OJT than average and who have never migrated since childhood. Compared to this range, differences in industry and stratification variables generate an earnings interval only 1/5 as large. Thus clearly for the white male workforce as a whole, the primary factors determining the distribution of earnings are related to human capital. Nonetheless, for those "entrapped" in the less skilled sector, industry and stratification factors are by far the more important variables. As long as the entrapment continues, increases in human capital will have little realized value.

Among black males the results are more ambiguous. There does not appear to be any clear-cut trend in the size of the human capital induced wage intervals over the range of occupations nor is there a trend in the Z/HC ratios. While black men have relatively larger earnings differentials associated with industry and stratification factors, their HC-intervals are correspondingly larger leaving relatively smaller Z/HC ratios than white men in occupation strata 1-3 and 6-9. On the other hand no single stratum ratio is below unity suggesting that even in the relatively skilled strata the non-human capital factors play a substantial role in wage determination. The Z/HC ratio of .74 across strata discloses that both human capital and institutional factors are each of critical importance.

For white women the non-human capital factors clearly dominate the picture with a possible exception in the professional strata. The human capital induced intervals are universally small in the first three occupation groups and in fact in the 6-9 stratum human capital differences have absolutely no effect on wage differentials at all. All explained variance in these earnings are a function of industry and occupational attachment, the Z/HC ratio being mathematically undefined. Finally for all strata combined, the industry and stratification factors measured ad conjunctum are more than three times more powerful than the human capital variables measured ad seriatum. Thus we move to the very opposite of the continuum from white men, suggesting that human capital differences are relatively insignificant in determining the female personal distribution of earnings while non-human capital factors dominate the field.

The results for black women are similar to those of black men with the exception of occupation group 6-9. The human capital intervals are of generally the same magnitude as the Z-intervals in each of the individual occupation groups and across all strata. Again it appears that both human capital factors on the one hand and industry and stratification factors on the other play important roles in the wage determination process. Changes in either set of factors can be expected to have a substantial impact on estimated earnings.

In concluding we can turn to the results for the whole labor force taken together. Here we find general trends which parallel those for white men, but levels that are much closer to those found for each of the minority groups. With the exception of the non-comparable 6-9 strata, there is a monotonic downward trend in the z-interval accompanied by a less regular upward trend in the impact of the human capital module. Together they produce a concise picture of the relative impact of the two sets of factors. Among the least skilled workers in the economy, industry and stratification factors produce an earnings differential 2.6 times the size of the human capital interval. This ratio falls (with the obvious exception of occ group 6-9) until it reaches .33 among the highest skilled occupations. Again this leads us to the conclusion that human capital factors are of substantial import but primarily only in the higher skilled strata. For the rest of the workforce, institutional and stratification factors are unambiguously important as independent, and to a great extent primary, determinants of the personal earnings distribution.

For the labor force as a whole, taking into account the relative population size in each strata, a comparison of the Z and HC intervals in the "grand pooled" regression suggests that the estimated impact of the industry and stratification modules is about two-thirds the size of the effect of the human capital module. Both are important with human capital having a slight edge.[20] Nonetheless the massive earnings differentials associated with (1) industry and occupation crowding (2) differences in industry characteristics and

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[20] It should be emphasized that the range over which the human capital factors are allowed to vary is by no means narrow. In the "grand pooled" regression, the 93 percent earnings differential is the total interval between two workers who have the following human capital characteristics

+HC-interval	-HC-interval
School = 13.68 years (Junior College)	School = 7.86 years (Elementary School)
Institutional Training	No Institutional Training
Migrant	Non-migrant
40 years Experience	16 years Experience
SVP = 6.73 (2-4 years of OJT)	SVP = 2.97 (30 days-3 months OJT)

(3) miscellaneous factors concerning imperfections in the functioning of labor markets including pure discrimination, information barriers, and lock-in effects are obviously too large to ignore. Contemporary labor markets do not appear to be particularly efficient in matching workers with given endogenous productivity characteristics to jobs requiring these talents. After controlling for human capital as best we can, the evidence points overwhelmingly to the fundamental soundness of institutionalist and stratification hypotheses and provides substantial evidence of the superiority of the personal earnings distribution theory presented here.

The implications of these findings for manpower policy and particularly the low-wage workforce are far-reaching. It is to this matter that we next turn.

CHAPTER VII

CONCLUSIONS AND IMPLICATIONS

This study began with a relatively specific concern: to understand why millions of full-time workers earn so little that their families become "working poor" in terms of the Bureau of Labor Statistic's budget for a "low standard of living" or worse yet the Social Security Administration's poverty line.[1] Even more specifically our concern was to determine to what extent the low incomes of the working poor are primarily the result of inadequate human capital vs. the legacy of labor market imperfections.

Inevitably this relatively narrow problem gave way to much broader questions about the determinants of earnings for the labor force as a whole and finally prompted the construction of a general distribution theory and the development of a comprehensive data set to test it. While the results of our inquiry are, of course, not absolutely incontrovertible, the evidence from the regression analysis seems more than sufficient to warrant some important conclusions about the American labor market and particularly about the market for less skilled labor. There are a number of policy implications in the manpower area that follow from this analysis.

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[1] In 1967, the Social Security Administration's "poverty line" for a non-farm family of four was $3,410 while the Bureau of Labor Statistic's "low standard of living" budget for an urban family of four was $5,915. These figures can be found in U.S. Bureau of the Census, Current Population Reports: Consumer Income, "Characteristics of the Low-Income Population 1970" (Washington, D.C.: Gov't Printing Office), Series P-60, No. 81, November 1971 Table M., p. 19 and U.S. Department of Labor, Office of Information, "Three Standards of Living for an Urban Family of Four Persons, Spring 1967" (Washington, D.C.: Gov't Printing Office), March 1969.

It would be highly repetitive to recap all of the results presented in Chapters V and VI, but we can reiterate the major conclusions of those chapters and comment on some of the implications that follow from them. Obviously with the space available we can only outline some of these implications. A more in-depth analysis will have to wait for another day.

By far the most important conclusion of our analysis is that the American labor market is considerably inefficient in terms of matching what we have called "endogenous productivities" to marginal products or wages. Much of the labor force appears to be paid at rates not consonant with their measured human capital.[2] The result is "relative underemployment" of large segments of the labor force, particularly among minorities and less-skilled workers. Without altering an individual's human capital it is often possible, at least hypothetically, to increase that worker's earnings significantly by only "relocating" the worker from one industry or occupation to another. The wage intervals we discovered for similarly qualified workers are large enough to make the difference between poverty and a so-called adequate family income. For example, when we hold human capital constant for occupation group 1-3, where many of the working poor are found, we find a wage range of $3037 to $6386, figures that bracket the poverty line and the BLS "low standard of living" budget. In other occupation strata we find large "human capital constant" wage intervals as well: $2516 in occupation group 5, $3202 in group 6-9, $2350 in group 12-14, and $2974 in the highest skill category. For the full-time workforce as a whole, the wage range due to differential industry and occupational attachment is $7634 vs. $4784. Thus a worker in the labor [illegible]ce having "average" amounts of human capital but who gains access to a "permissive economic environment" will earn almost 60 percent more than a similarly qualified worker in a minority-crowded, competitive, unorganized, low profit industry.

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[2] We should stress the term "measured" once again, for it is almost certain that some forms of human capital have not been included in this analysis which partly account for some of the unexplained variance in earnings. In addition we should note that individual preferences have not been explicitly taken into account so that factors like "voluntary" immobility may also be responsible for some of the apparent "inefficiencies" in the labor market.

What is also clear from the analysis is that different segments of the labor force face very different problems in the labor market. In general, low incomes among white men are the result of inadequate human capital, although imperfections in labor market information and possibly the "lock-in" effects of prohibitively expensive geographical relocation and non-vested seniority and pension rights appear to promote significant wage differences among less skilled workers. Among white women, on the other hand, measured differences in human capital can explain practically none of the large wage differentials even among relatively skilled strata. Our analysis indicates, in fact, that 95 percent of the difference in earnings between white women and white men is due to factors other than measured human capital. Much of the total variance in our analysis is left unexplained, but that which can be determined is disproportionately caused by imperfections in the job market. The segmentation of the labor market into "male" and "female" job slots seems to play a crucial role in wage determination. For black men and women, both the human capital and institutional hypotheses are borne out in the wage determination process.

In theoretically specifying "imperfections" in the labor market, emphasis was placed on the "crowding" hypothesis. As we expected, the evidence for crowding is substantial although not definitive. To prove crowding as a culprit in the wage determination process, it would have been necessary to obtain actual estimates of the labor supply and demand functions in each industry and occupation. Unfortunately, for all practical purposes, this is an impossible task. The minority employment variables we chose as proxies have the problem of being substantially colinear with race and sex particularly because sex-linked stratification is so pervasive. Nevertheless the "crowding" variables were often significant within individual race-sex groups (including white men) after controlling for human capital and even in a number of the cross race-sex equations after dummies for race and sex were added. Both of these tests suggest that crowding has an independent effect on earnings.[3] What is important to remember, however, is that whether the STRAT module measures the specific form of discrimination known as "crowding" or some other form of discrimination is less important than the fact that something to do with race and sex is an extremely powerful determinant of personal income. It is perhaps the major reason for the lack of colinearity between endogenous productivity and earnings.

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[3] Data from the Census Bureau's Consumer Income series provides

Insofar as there is evidence of "crowding" it was possible to divide its effect into "simple" and "complex" forms depending on whether in addition to the stratification factors differences in industry characteristics had an impact on the distribution of earnings. The compelling conclusion seems to be that "complex" crowding is the general rule throughout but particularly so for the minority groups. Simple crowding explained wage differentials for white men in occupation strata 1-3 and 6-9 while all black male, black female, and white female groups (excluding white women in occ group 1-3) were typified by significant industry as well as stratification variables. Employment in a permissive economic environment of extensive oligopoly, high profits, and capital intensity added significantly to the earnings

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corroborative evidence of "crowding" of white female labor. Since 1955 the ratio of full-time, full-year white female/white male wage and salary income has secularly fallen as the labor force participation rate of white women has risen. In 1955 the ratio was .644; by 1968 it had fallen to .586 and is continuing to fall. In the absence of crowding--and assuring no divergence in human capital or intensification of pure "sexist" attitudes--there is no reason to believe this ratio would fall. The increase in female supply should affect white male wages as well, if crowding is not operating. No other theory seems to explain this phenomenon as well. See U.S. Census Bureau, Current Population Reports--Consumer Income Series, P-60, No. 69, April 6, 1970, Table A-8, p. 86.

of minority group members, a finding in complete accord with traditional institutionalist theory.

One thing that becomes abundantly clear in the analysis, particularly in Chapter VI, is the dramatic change in the relative importance of the human capital and non-human capital factors as one moves from the low-skilled to the high-skilled occupation strata. Industry and stratification factors are universally dominant among the lower skilled strata while human capital takes on a larger and larger role as one proceeds up the occupational hierarchy. For the labor force in occupation group 1-3 we found that the industry and stratification factors produce an earnings differential 2.6 times the size of the wage differential due to differences in human capital. But among the highest skilled group the ratio falls to only .33 after a near secular decline through the whole occupational range. At the top of the hierarchy labor markets appear much more "efficient" in allocating workers according to their endogenous productivity characteristics.

There are a number of more specific findings that bear repeating. One of these is the statistical insignificance of institutional training as a determinant of earnings for every group with the exception of black males. For black men, the training variable was significant and relatively substantial in occupation groups 1-3 and 12-14 in addition to the cross-occupation regression. In no other regression was this true. This may be due to the poor measurement of this variable, or it might have some important content as we shall later suggest.

On-the-job training, as measured by SVP, is an especially powerful variable in the higher occupation groups and across all occupation strata, but there remains great confusion as to what this finding actually proves. Because SVP is only obtained after access to a specific occupation is gained, it is difficult to treat it in like manner to the other variables in the human capital module. If occupational access is barred by discrimination or some other imperfection in the labor market, SVP may be better treated as a stratification variable and its effect counted here. On-the-job training is therefore of critical importance in wage determination, but it is difficult to suggest how social policy might be developed to deal with it based on our analysis.

Finally we should note that we have found practically no evidence of "compensatory" wage payments for physically demanding, unpleasant, or dangerous work. While our proxies for these factors are not especially well-measured, we often find a negative rather than positive sign on these variables. If we follow the signs on the coefficients, we note that there are a number of negative signs in the low-skill categories followed by insignificant coefficients in the middle and higher skill categories. The one positive sign we find is among relatively skilled white men. Only here is the compensatory theory borne out by the evidence. In the lower occupation strata differences in working conditions may be completely overshadowed by the effect of stratification while in the upper strata the true effect can be measured because stratification plays a much weaker role. Alternatively it is possible that differences in ability and skill have not been held constant enough to pick up small, but nonetheless existing, "compensatory" effects.

Theories to Explain These Results

The overall picture then is one of a highly imperfect labor market stratified by race and sex. By no means is the human capital theory disproved or completely rejected, but the general theory of personal earnings developed here is clearly superior in its ability to describe the parameters of the earnings distribution. Yet the "theory" is primarily only a description even allowing for the analytic properties of the crowding hypothesis. The unanswered question is what dynamic is responsible for promoting such a labor market structure and then what can be done to alleviate its perverse distributional and allocational effects. We cannot hope to give a definitive answer to this gargantuan question, but we can attempt some brief conjecture.

We should note once again for the record that a strict human capital theorist will probably deny much of the evidence presented here and therefore possibly not see the need for an explanation at all. Arguing that the human capital module is misspecified and the data inadequate is one possible way to explain away the results found in this analysis. There is no measure of innate talent and admittedly there is an inadequate specification of interactions between human capital variables. But this, in our opinion, cannot account for the apparent wage intervals we have found associated with non-human capital factors, particularly after loading the analysis in favor of the human capital explanation at every turn. We feel that our analysis clearly does demonstrate the existence of widespread imperfections which cannot be explained away so simply. Assuming our results generally correct we need to explain them.

One possible explanation comes from radical stratification theory. The large wage differentials we have found associated with race and sex can be interpreted as consistent with the "divide and conquer" theory which is currently being developed.[4] At considerable risk of oversimplifying and thereby vulgarizing radical theory, the argument can be paraphrased. In order to keep the whole working class from organizing en masse to overturn the capitalist order, the "ruling class" has consciously devised institutions to prevent the development of subjective class consciousness among all workers. Racism and sexism have been deliberately instigated to affect divisions within the working class along these lines. In its "vulgar" treatment, radical stratification theory looks to conscious racist and sexist hiring and promotion decisions by management as the major tools of the "divide and conquer" strategy. More realistically, however, radical theory points to the roles of social and cultural institutions, particularly the schools and "bourgeois" family customs, in dividing the working class.

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[4] For one version of the "divide and conquer" theory see David M. Gordon, Richard C. Edwards, and Michael Reich, "Labor Market Segmentation in American Capitalism," Conference on Labor Market Segmentation, Harvard University, March 16-17, 1973 (mimeo). Also see, Stephan Marglin, "What Do Bosses Do?" Review of Radical Political Economics, Vol. 6, No. 2, Summer 1974.

Taken in this broader context, radical stratification theory, we believe, has much to offer in producing an understanding of the overall income and wealth distribution we experience in the United States. It is clear that massive differences in schooling and in sex roles are fostered in our society which end up segmenting the labor force into different occupation strata.[5] Race, sex, and social class, as we argued in the general stratification theory, can easily be seen as the primary exogenous factors in determining the final distribution of income.

But the problem in the present analysis is much narrower in at least one respect. Here we have held human capital constant and asked the question how much of the variance in earnings can be explained by other factors. We therefore need a much more specific theory which relates these human capital constant wage differences to factors that operate in specific labor markets, not necessarily the social milieu more broadly defined. One obvious answer to explain wage differences is pure discrimination on the part of firms. Another is simply information imperfections which never get fully resolved.

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[5] For an excellent treatment of this subject, see Samuel Bowles, "Unequal Education and the Reproduction of the Social Division of Labor," Review of Radical Political Economics, Vol. 3, No. 4, Fall-Winter 1971 and Samuel Bowles, "Understanding Unequal Economic Opportunity: The Role of Schooling, I.Q., and Family Economic Status," American Economic Review, May 1973.

But there is good reason to believe that such answers are indeed too simplistic. An adequate theory must do more than explain the existence of wage differentials which are not related to human capital. Such a theory must also be able to explain why industry-related wage intervals are largest in the lower-skilled strata while at the top of the occupational hierarchy the human capital elements dominate. Extending the brief analysis in Chapter VI, an eclectic theory can be suggested which meets these requirements. It is based on a combination of theories including (1) job competition (2) labor market search (3) quasi-fixed factor and (4) statistical discrimination all of which are placed within a specific historical context. A rigorous treatment of this eclectic model can most likely be demonstrated, but for the present we must be content with simply laying out the basic structure of the argument. One thing that is especially significant about the eclectic theory is that while it is consistent with the "crowding" hypothesis and radical stratification theory, it does not rely on a "conspiracy" theory of capitalist institutions.

As in Chapter VI assume a job competition model where job/wage slots are given exogenously, at least in the short run, and there are fixed costs of hiring and training labor. The fixed costs rise with increasing job complexity so that there is a general positive relationship between the degree of "fixity" and occupation strata. Also assume that information about potential employees is imperfect and involves procurement costs. Information on average group characteristics, even if imprecise, is relatively inexpensive to obtain while information about specific individuals is costly.

With these assumptions and the additional one that firms attempt to minimize total labor cost in an attempt to maximize profit, we can generate a theory fully consistent with most of our findings. Firms will attempt to minimize the sum of direct payments to labor plus search costs plus hiring and training costs. These costs are not independent of each other for higher wage offers can reduce search costs by increasing the supply of labor to the firm and greater search effort can reduce training costs by providing a higher expected probability of acquiring workers who can be quickly and efficiently trained. Wherever the training requirements for a specific job are minimal we can expect that the rational firm will find it unnecessary to invest heavily in search, for recruitment "mistakes" do not force the firm to incur large sunk costs. On the other hand, wherever training requirements are substantial, the cost of a recruitment error is considerable. Therefore we can expect that there will be a positive relationship between the degree of fixity in a particular occupation stratum and search costs. To reduce the risk of large unprofitable sunk costs, firms will search intensively for recruits destined for skilled positions while expending little search effort for workers who are hired primarily to fill unskilled (low "fixity") slots.

In more specific terms, firms will investigate the individual characteristics of their prospective skilled employees while using rules of thumb or general search strategies to fill unskilled job slots. In the latter case, many firms will resort to statistical selection of one sort or another using supposedly objectively perceived group characteristics in making hiring decisions about specific individuals.[6] While "rational" in the limited economic sense, such a strategy is obviously prejudicial by definition.

One important question, of course, is what group characteristics are used for screening. Here is where the historical context inevitably plays a crucial role. The social and cultural institutions and belief systems embedded in any society are marked by substantial inertia. Once firmly established for whatever reason, they tend to be passively, if not actively, perpetuated. Without reviewing American (or for that matter much of all Western European) history it seems hardly necessary to "prove" that both blacks and women have historically been relegated to disadvantaged positions in the labor force, blacks through involuntary servitude and racial segregation and women through family custom.[7] Through the years custom and habit have produced some objective differences in group characteristics as well as (and probably more importantly) induced lingering perceptions of differences which may have no basis in fact. Both of these no doubt have a substantial impact on recruitment patterns.

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[6] See Kenneth Arrow, "Some Models of Racial Discrimination," op. cit.

[7] This analysis obviously begs the real question: why did the racial and sexual institutions and beliefs develop in the first place. Here "divide and conquer" theory suggests one possibility.

In the context of our culture, statistical screening then works itself out in terms of racist and sexist hiring procedures, not necessarily out of an express desire to "divide and conquer" or out of a deep-seated commitment to white male domination of society (although both of these may be operating). Rather if firms have widespread beliefs about the expected probabilities of employee "success"--whether these expectations be grounded in fact or not--the result will be stratification of the labor force.

To review, the lower the degree of fixity, the smaller the potential cost of a recruitment mistake which in turn leads to minimal search effort and a general tendency toward statistical discrimination as the firm's search technique. The end result inevitably is stratification of the labor force in the lower occupation strata. If a sufficient number of firms screen on the same characteristics, the result will be crowding and the development of large wage differentials between groups in the economy. Once the initial stratification has taken place, differential supply of on-the-job training (SVP) may tend to exacerbate these differences. Also once this system has been generated, it tends to be perpetuated. If the screening procedures seem to have "worked" in the past, they will tend to become rules of thumb to follow in the future. Thus even without pursuing a conscious policy of "divide and conquer," a private cost minimizing system will tend to perpetuate non-human capital linked stratification as long as labor market information is imperfect and costly to secure. In the absence of government intervention, the "social costs" of stratification will continue to be borne by minority members of the labor force. And these costs, as we have amply shown, are often immense. Whatever private gain might come from a "divide and conquer" policy if perpetrated may redound to the "capitalists'" benefit even without their active participation. In effect, then, a market system operating in an environment of (1) substantial quasi-fixed costs for skilled labor (2) non-zero cost information, and (3) a legacy of racist and sexist custom will tend to produce a "meritocracy" at the top of the occupational hierarchy and racial and sexual stratification at the bottom.

What's To Be Done?

The labor market we have uncovered is one involving large scale inefficiencies if one defines efficiency by a colinear mapping of endogenous productivity characteristics and earnings. Yet we have also posited a theory that the "inefficiencies" may be due to the labor market operating the best it can given the context of a supposedly free market and limited information. If the market is to be moved toward a more socially "efficient" and equitable allocation of labor, what must be done?

Obviously a labor market which is segmented in such a complex manner as we have discovered requires a multifaceted set of policies to ensure equal opportunity in the labor force and reduce allocational inefficiency. No single policy will be sufficient to redress the stratification in the labor market. Without going into detail, we can lay out a few areas in which we feel policy must be directed.

One obvious finding is that although labor market stratification is widespread, differences in human capital are still extremely important. Within each race-sex group increased human capital in the form of formal education, labor force experience, on-the-job training, and migration all pay off in terms of higher earnings. Yet there are great disparities that remain in the allocation of human capital between individuals, particularly on the basis of race and class. This has been amply demonstrated by other researchers.[8]

To redress the balance requires at a minimum equal educational opportunity if not compensatory educational programs for groups which have historically been at a competitive disadvantage. In order to ensure equal labor market opportunity may in fact require unequal educational opportunity, discriminating in favor of previously discriminated against minorities. Quota systems and direct application of affirmative action in college admissions, for example, are probably required. Other forms of human capital may be equalized by providing relocation allowances for those who can profit by moving from one area to another and providing incentives for firms to give on-the-job training to minority group members.[9]

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[8] See for instance, Samuel Bowles, "Schooling and Inequality from Generation to Generation," Journal of Political Economy, May 1972; W. Lee Hansen and Burton Weisbrod, "The Distribution of Costs and Direct Benefits of Public Higher Education: The Case of California, Journal of Human Resources, Spring 1969; Stanley H. Masters, "The Effect of Family Income on Children's Education: Some Findings on Inequality of Opportunity," Journal of Human Resources, Spring 1969; James S. Coleman, et al., Equality of Educational Opportunity (Washington: U.S. Government Printing Office, 1966); Patricia Cayo Sexton, Education and Income (New York: Viking Press, 1964); and Samuel Bowles, "Towards Equality of Educational Opportunity?" Harvard Educational Review, Vol. 38, Winter 1968.

But the primary implication of our analysis is that manipulation of non-human capital factors is also critical to addressing current labor market problems, particularly of the working poor. Insofar as direct discrimination is still widespread in the labor market, it is clear that equal employment opportunity legislation must be extended and forcefully implemented. As in education, affirmative action in employment is an important tool in promoting social efficiency in the labor market. More recent implementation of affirmative action may have already begun to excise the wage differentials between race-sex groups. Clearly such a direct approach to ending discrimination is warranted by the results presented in our analysis.

Beyond direct affirmative action, there seem to be a number of roles the government can play in regard to statistical discrimination. If, as we suspect, screening is often based on erroneous conjecture about group characteristics, the government can help to "correct the record." Such intervention in the market would not have the same powerful effect of direct action, but it no doubt should be in the government's policy tool-box. Where substantial discrimination is "objective," then the government must find the means for decreasing the private sector's cost of procuring individual job applicant information. This role could be played by a much more effective public employment service which would have the funds and the expertise to accurately screen individuals on the basis of relevant job characteristics.[10] The current Employment Service has generally failed in its attempt to bring low-skill workers and jobs together.[11]

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[9] This latter policy suggestion should be qualified for according to the General Accounting Office, firms can take advantage of on-the-job training subsidies without providing much additional benefit to disadvantaged workers. See Chapter I, footnote 8.

More specific implications can be drawn from the analysis about manpower training programs. We noted at the beginning of this inquiry that most social scientists and government officials have been disappointed with the performance of manpower programs in the United States. In the present analysis we find additional evidence that institutional vocational programs have failed to have much of an impact on earnings (although we have no information on their effect on securing employment). The "training" variable is significant only for black males as far as the individual race-sex equations are concerned. Training is never significant for white men nor either group of women. This result caused some consternation for we originally suspected that if any group should benefit from institutional training it would be white men. But here we find only black men apparently gaining from these programs. One explanation, of course, is that the result is purely spurious, but there is an alternative that we prefer.

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[10] See Richard Lester, Manpower Planning in a Free Society (Princeton: Princeton University Press, 1966) and Alfred L. Green, Manpower and the Public Employment Service in Europe (New York: New York State Department of Labor, 1966).

[11] One new piece of evidence for this conclusion comes from a recent study in the Boston labor market conducted by the Social Welfare Regional Research Institute, Boston College. In virtually all of the firms studied by SWRRI, the employment service was not considered a reliable source for obtaining relatively less skilled labor and therefore was rarely contacted about job vacancies. Robert Hubbell and Martha MacDonald, "A Study of Employee Recruitment in Boston," Social Welfare Regional Research Institute, Boston College, Working Paper, forthcoming.

It has often been suggested that manpower training programs do little to increase the actual productivity of workers but play a primary role in the screening of recruits.[12] White males do not gain from this additional "screen" because they already are "screened into" the better occupations and industries by reason of their race and sex. For blacks, however, training plays the critical role of signaling to potential employers the special motivation that trainees may engender or appear to engender. In this case firms can use enrollment in a training program as a way of screening in a few black recruits while the normally operating racially-linked statistical discrimination screens out all others. If this is true, then institutional training is obviously an important "human capital" variable for black men, although its usefulness as a screening device might depreciate as the number of institutionally trained black workers increases. All of this is but conjecture at this point, but it makes some sense within the context of the general stratification theory underlying our analysis.[13]

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[12] See Ivar Berg, Education and Jobs: The Great Training Robbery (New York: Praeger, 1969).

[13] It has been suggested to me by several colleagues that institutional training may even be a negative credential for white men if employers see enrollment as an indication of labor market disadvantagement. A "good" worker should not need a vocational training program, might be the thinking of employers.

Finally we may conclude by mentioning the broadest implications of our analysis. What we believe we ultimately have shown is that the distribution of earnings in the United States is substantially arbitrary with respect to human capital. A large part of earnings differentials have been shown to be related to non-human capital factors so that the overall distribution of earnings can be described as "unfair" with equal human inputs being rewarded with vastly unequal returns. Much of the justification for existing wage and income differences attributed to marginal productivity theory thus pales before this analysis even if one has accepted the questionable premise that a just distribution of income is one based on marginal products.[14] Imperfections are so extensive and their effect so deep that the relationship between endogenous productivity and marginal product is far from colinear.

If individual policies of systematically countering imperfections in the labor market cannot assure a solution to the distribution problem--which is very possibly the case--then it will probably be required, at least in the short run, to resort to direct redistribution of income via negative income taxes or other forms of income guarantee. Such a redistribution would be far from perfect in redressing the balance, but would be in general accord with the policy implications that flow from the crowding hypothesis. Under a negative income tax, income would be transferred from those who have higher earnings in part due to segregation to those who have been the victims of a stratified labor market. In this case direct redistribution is a surrogate for what would actually occur in the labor market if barriers to mobility were reduced.

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[14] See J.B. Clark for an early statement of the neoclassical "just" wage doctrine. John Bates Clark, The Distribution of Wealth (New York: MacMillan, 1900), esp. Chapter 1 or Milton Friedman, Price Theory: A Provisional Text (Chicago, Aldine, 1967), Ch. 10.

Thus the policy implications of our findings are extremely far-reaching. They demand that policy-makers understand the need for wide-ranging intervention in the economy at the micro level in order to move toward a more "efficient" and distributionally fair labor market. Direct attacks on the structure of labor markets will often be much more effective particularly for lower-skilled workers than attempts to remedy all problems through individualistic human capital policy. All of this, of course, abstracts from even broader questions of the control of the economy at large . . . but this is a question to which I hope to devote my future work.

APPENDIX A

THE DATA SOURCE

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THE DATA SOURCE

The ability to test the general earnings model developed in this thesis rests on the development of a comprehensive micro-macro merged data set. This data set which is based on the 1967 Survey of Economic Opportunity was prepared over the course of one and a half years by Professor Mary Stevenson, now of the University of Massachusetts-Boston, and myself with the help of the staff at the Institute of Labor and Industrial Relations-Research Division at the University of Michigan.

Three types of data were compiled and merged to complete the computer file, S1480, which was used in all of the analysis. Data from the 1967 SEO formed the basic sample. Information on personal characteristics from this source was supplemented by linked information from the panel portion of the 1966 SEO. The second type of data involved the compilation and linkage to the SEO file of data on occupational characteristics, the primary sources being the Dictionary of Occupational Titles and the U.S. Census volume on "Occupational Characteristics." The third type of data was macro information on industry characteristics compiled from a broad range of sources. This too was merged onto the SEO file so that the final S1480 tape contained personal information on a large sample of workers with accompanying data for each individual on that worker's occupation and industry. Thus for every worker on the SEO file we can ascertain such individual characteristics as educational attainment and age, but also a good deal about the training required and the working conditions in that worker's occupation and the profit rate and the concentration ratio in that worker's industry.

The SEO Data Base

The Survey of Economic Opportunity (SEO) for 1967 contains information collected in a sample survey conducted in the Spring of that year.[1] The Bureau of Census conducted the survey for the Office of Economic Opportunity to supplement the information regularly collected in the Current Population Surveys (CPS) for February and March of each year. The common items in the SEO and CPS include personal characteristics (e.g. age, race, sex, family relationship, marital status), last year's work experience and income. The CPS, conducted every month, is the basis for monthly labor force statistics including unemployment rates.

In addition to the normal information gathered in the CPS, the SEO provides information on dimensions of poverty not usually obtained between the decennial census years. Of equal importance, the SEO oversampled nonwhite census tracts to achieve better estimates of the characteristics of the nonwhite poor. The national self-weighting sample has approximately 18,000 households, drawn in the same way as the CPS sample. The oversample in areas with large nonwhite populations has 12,000 additional households. The combined sample yields over 57,000 adults, age 16 and over.

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[1] This file is available from the Data and Computation Center, The University of Wisconsin, 4452 Social Science Building, Madison, Wisconsin 53706.

Working 40 weeks in the previous year and a minimum of 30 hours in the survey week at one's "usual" job qualified an individual as a full-time full-year worker for the purpose of the present analysis. Individuals who worked at least this much, but responded that their present job was not their "usual" job were not included in the sample, for the hourly wage they report may have little relation to the occupation and industry indicated in their survey record. All whites and blacks in the self-weighting sample 25 years or older who qualified as full-time full-year workers by these criteria were automatically included in our analysis. Nonwhites who are not black were excluded from the sample, since including Puerto Ricans and Mexican-Americans in with the white or black samples would be misleading because of different labor force characteristics. Analyzing them separately, however, is impossible because of small sample size.

In addition to the self-weighting sample, blacks in the supplementary survey who met the full-time full-year qualifications were included in the study population. The blacks in the supplementary sample were found to be quite similar to the blacks in the self-weighting sample according to an examination of means and Chi-square tests. Thus, combining the two samples did not significantly alter the qualitative results and the additional size added immeasurably to the reliability of the estimates of black characteristics. However, the whites in the "nonwhite" supplement were not included in the analysis. Preliminary investigation indicated significant differences between whites in the self-weighted survey and the supplementary sample. Without the use of weighted counts, the addition of the whites in the supplement would have qualitatively altered the results for all whites in the population. Without the supplement, the sample size for the white population is sufficient to yield reliable statistics in even highly stratified analysis.

In all, there are over 57,000 individuals 16 years and older in the 1967 SEO file. Of these, nearly 14,000 meet the full-time full-year and "usual" job qualifications. (See Table A.1) Almost 10,000 are in the self-weighting sample; the rest are blacks in the supplemental survey. Nearly 9,300 are males; 4,700 are females. In all, there are nearly 9,000 whites and 5,000 full-time full-year blacks. White males are the most numerous; black females are least numerous. Nonetheless there are 1,867 full-time full-year black women workers in this study. In all four race-sex groups it is then possible to stratify the sample extensively and still maintain ample cell sizes and reliable estimates even after discarding individuals for whom there is incomplete occupation and industry data.

The 1967 SEO yields information on all of the individually measured variables needed in the analysis with the exception of a

TABLE A.1

THE SEO SAMPLE POPULATION OF FULL-TIME FULL-YEAR WORKERS

	Self-weighting Sample	Nonwhite Supplement	Total
White Males	6257	0	6257
Black Males	594	2242	3036
Total Males	6851	2442	9293
White Females	2736	0	2736
Black Famales	362	1505	1867
Total Females	3098	1505	4603
Total White	8993	0	8993
Total Black	956	3947	4903
Grand Total	9949	3947	13896

measure of vocational training. A question about institutional training was asked, however, in the 1966 SEO. Given that the same addresses were interviewed in both years, a large percentage of the sample population were interviewed in both years. Given this fact and the ability to link the 1966 and 1967 SEO surveys, it was possible to add information about vocational training to over three-fourths of the 1967 sample. This was done.

The final variables used from the Survey of Economic Opportunity included:

Hourly Wage - The dependent variable is hourly wage (last week) computed from answers to questions which indicate the number of hours respondent worked last week and indicating the respondent's earnings last week. Given the proviso of full-time employment at "usual" job, this variable is somewhat cleaner than comparable measures of earnings. The major problem is the possibility of inflating the straight-time earnings rate due to special overtime rates. To the extent that overtime is "usual" in a given occupation, this would not necessarily overstate the earnings measure we are after. The major problem arises when in the week before the interview, an individual worker had an unusual number of employed hours. It was not possible to take this factor into account. However it seems reasonable to believe that it would not seriously bias the final results.

Schooling - This variable is taken directly from the question on "highest grade completed."

School-South - This interaction term is computed from the answer to the question on highest grade completed and the answer to the question "region at age 16." A dummy value of 1 is assigned to the region South.

Training - This variable from the 1966 SEO was intended to account for institutional training of a variety of types. These included: business college or technical training, apprenticeship training, full-time company training, vocational training in the armed forces, other formal vocational or technical training, or non-regular schooling. A dummy value of 1 is assigned if the respondent had been or was currently enrolled in any of these training programs. It was not possible to ascertain whether the respondent had completed training nor whether the training was related to subsequent occupational attachment.

Migration - This dummy variable was computed from the question "age left last residence." A dummy value of 1 is assigned to a respondent who was a "nonmover" indicating that this individual had never moved more than 50 miles from his residence since age 16.

Experience - This variable was computed from questions on the individual's age and highest grade completed. The actual variable used was (AGE-SCHOOL-6) indicating the number of years out of school and presumably available to participate in the labor force.

Union Member - This stratification variable was taken from the question, "belong to a union." It was asked only of private wage and salary workers. A union was construed as an organized craft, industrial, or professional union such as the bricklayers union, the United Auto Workers, teachers union, etc. Fraternal or social organizations such as Masons, Shriners, Elks, etc. were not considered as unions. Similarly, professional organizations were not considered as unions.

Race - This variable referred to "white" or "negro."

Sex - This variable referred to "male" or "female."

In addition to these factors, the SEO provided occupation and industry codes for each individual which were used to merge occupation and industry data onto each micro-record.

Construction of Occupation Scores

Three kinds of occupation data were collected: (1) data on education and training requirements (2) data on working conditions, and (3) data on the degree of minority employment. The first two types were compiled with the use of the Dictionary of Occupational Titles (DOT) while the third made use of the "Occupational Characteristics" volume of the 1960 Population Census.[2]

The DOT is a vast store of data on individual occupations which is rapidly coming into use by social scientists after being primarily the domain of job placement officers. The Dictionary has information on the general education and specific vocational preparation requirements as well as data on working conditions for some 4,000 specific occupation titles. The data for the Dictionary were collected and developed according to job analysis techniques established by the U.S. Employment Service. In most cases, the same job was analyzed in two different establishments in one State and then in two different establishments in another State. The findings of these studies were correlated and job definitions prepared. As a result, information presented in the Dictionary reflects the findings of the U.S. Employment Service from approximately 75,000 studies of individual job situations.[3]

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[2] U.S. Department of Labor, Manpower Administration, A Supplement to the Dictionary of Occupational Titles, 3rd. Ed. (Washington, D.C. Government Printing Office, 1966); and U.S. Census Bureau, United States Census of Population: 1960, "Occupational Characteristics," Series PC(2) 7A, 1966.

[3] A Supplement to the Dictionary of Occupational Titles, op. cit., p. vii.

Fortunately for economic research, the General Educational Development (GED) and Specific Vocational Preparation (SVP) scales for each occupation are based on functional or performance requirements. According to Sidney Fine,[4]

> These are the requirements determined by objective job analysis as necessary and sufficient to achieve average performance in the specific tasks of the jobs. Such estimates try to focus on the tasks performed in relation to the things, the data, or the people involved in those tasks.

Thus for each occupation an objective analysis of the job, not the worker, is performed, yielding an independent measure of job content. This is, of course, of crucial importance for otherwise there would be in the data a tautological relationship between a worker's characteristics and the characteristics of the job he or she performed.

A "years of schooling" scale for GED was avoided when the estimates were being developed. Instead the approach used was to ask: What basic skills are people supposed to acquire as a result of general education, and what is the role of these skills in jobs? Three fundamental skills were delineated: reasoning, mathematics, and language. The requirements for each of these fundamental skills were explored in a variety of jobs, and the scales currently in use were developed to permit estimates from very low to very high requirements. Again, attempts to translate these estimates into a time scale related to years of schooling completed in one educational system were resolutely avoided.[5]

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[4] Sidney A. Fine, "The Use of the 'Dictionary of Occupational Titles' as a Source of Estimates of Educational and Training Requirements," Journal of Human Resources, Winter 1968, p. 365.

Each specific occupation was assigned a GED score on the basis of these requirements. The rating system is reproduced in Table A.2 reprinted from the Dictionary.

The SVP scale, unlike GED, is a time scale. It is described as follows:[6]

> Vocational Preparation: This is the amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. This training may be acquired in a school, work, or a vocational environment. It does not include orientation training required of even every fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes training given in any of the following circumstances:
> (a) Vocational education
> (b) Apprentice training
> (c) In-plant training
> (d) On-the-job training
> (e) Essential experience in other jobs

Each of these various types of training for an occupation was converted to a time period and the periods were then added to provide the final estimate of required specific vocational preparation (SVP) for each job. The SVP scale is reproduced in Table A.3.

In addition to the GED and SVP scales, the DOT rates occupations in terms of "Physical Demands" and "Working Conditions." The Physical Demands scale includes data on required strength as well as the need

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[5] Ibid., pp. 366-367.

[6] Ibid., p. 368.

TABLE A.2

GENERAL EDUCATIONAL DEVELOPMENT

Level	Reasoning Development	Mathematical Development	Language Development
6	Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.	Apply knowledge of advanced mathematical and statistical techniques such as differential and integral calculus, factor analysis, and probability determination, or work with a wide variety of theoretical mathematical concepts and make original applications of mathematical procedures, as in empirical and differential equations.	Comprehension and expression of a level to— —Report, write, or edit articles for such publications as newspapers, magazines, and technical or scientific journals. Prepare and draw up deeds, leases, wills, mortgages, and contracts. —Prepare and deliver lectures on politics, economics, education, or science. —Interview, counsel, or advise such people as students, clients, or patients, in such matters as welfare eligibility, vocational rehabilitation, mental hygiene, or marital relations. —Evaluate engineering technical data to design buildings and bridges.
5	Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions, in books, manuals, and mathematical or diagrammatic form. Deal with several abstract and concrete variables.		
4	Apply principles of rational systems [1] to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.	Perform ordinary arithmetic, algebraic, and geometric procedures in standard, practical applications.	Comprehension and expression of a level to— —Transcribe dictation, make appointments for executive and handle his personal mail, interview and screen people wishing to speak to him, and write routine correspondence on own initiative. —Interview job applicants to determine work best suited for their abilities and experience, and contact employers to interest them in services of agency. —Interpret technical manuals as well as drawings and specifications, such as layouts, blueprints, and schematics.
3	Apply common sense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.	Make arithmetic calculations involving fractions, decimals, and percentages.	Comprehension and expression of a level to— —File, post, and mail such material as forms, checks, receipts, and bills. —Copy data from one record to another, fill in report forms, and type all work from rough draft or corrected copy. —Interview members of household to obtain such information as age, occupation, and number of children, to be used as data for surveys or economic studies. —Guide people on tours through historical or public buildings, describing such features as size, value, and points of interest.
2	Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Use arithmetic to add, subtract, multiply, and divide whole numbers.	
1	Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.	Perform simple addition and subtraction, reading and copying of figures, or counting and recording.	Comprehension and expression of a level to— —Learn job duties from oral instructions or demonstration. —Write identifying information, such as name and address of customer, weight, number, or type of product, on tags or slips. —Request orally, or in writing, such supplies as linen, soap, or work materials.

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[1] Examples of "principles of rational systems" are: Bookkeeping, internal combustion engines, electric wiring systems, house building, nursing, farm management, ship sailing.

Source: A Supplement to the Dictionary of Occupational Titles, p. A-6.

TABLE A.3

SPECIFIC VOCATIONAL PREPARATION SCALE

9 - Over 10 years
8 - 4 to 10 years
7 - 2 to 4 years
6 - 1 to 2 years
5 - 6 months to 1 year
4 - 3 to 6 months
3 - 30 days to 3 months
2 - Short Demonstration - 30 days
1 - Short Demonstration only

Source: A Supplement to the Dictionary of Occupational Titles, p. A-7

to perform physical tasks such as climbing and balancing, stooping, kneeling, talking, hearing, and seeing. We restricted our measure to physical strength requirements using the DOT scale reported in Table A.4.

TABLE A.4

THE PHYSICAL DEMANDS SCALE FOR STRENGTH
Strength (Lift, Carry, Push, Pull)

	Maximum Lift	Frequent Lift/Carry
1 - Sedentary (S)	10 lbs.	
2 - Light (L)	20 lbs.	Up to 10 lbs.
3 - Medium (M)	50 lbs.	Up to 25 lbs.
4 - Heavy (H)	100 lbs.	Up to 50 lbs.
5 - Very Heavy (V)	Over 100 lbs.	Over 50 lbs.

Source: A Supplement to the Dictionary of Occupational Titles, p. A-7

Obviously this scale is insufficient as a complete measure of physical demands on a given job. Any other measure, however, would have taken a prohibitively long period of time to compute.

Our measure of "negative" working conditions also leaves a good deal to be desired, but again it was the only measure that could be computed without resorting to a full investigation of each occupation in detail. Each occupation can be rated in terms of whether the job subjects the worker to certain working conditions including "extremes of cold plus temperature changes," "extremes of heat," "wet and humidity," "noise and vibration," "hazards," and "fumes, odors, toxic conditions, dust, or poor ventilation." For each occupation we took the number of negative working conditions as our measure for this variable. This is surely a weak measure for it fails to account for the intensity or degree of the negative conditions. A given job which subjects a worker to great hazard to life and limb may have only one negative trait (i.e. "hazards") while another job might subject the worker to some humidity, noise and fumes and thus be counted as having three negative traits. But again we felt this measure was better than no measure at all.

The problem with using the DOT to obtain measures of GED, SVP, physical demands, and working conditions is that the more than 4,000 specific job titles were not at the time of our research readily transferable into the three hundred odd census occupation codes. (Since completing our research the BLS has issued a Census Code-DOT conversion table.) It was thus necessary to develop our own conversion routine so that DOT characteristics could be assigned to each census occupation code. This was accomplished by matching DOT titles and six-digit codes directly to the list of census occupation names, using our knowledge of the occupation structure to make the match. This process took literally months to complete and once done was checked independently by a group of manpower experts associated with the Institute of Labor and Industrial Relations-Research Division at the University of Michigan. Finally we were able to check our conversion routine against a preliminary version of the BLS conversion table and make final corrections. It is possible that even after this painstaking task there are some errors in our conversion system, but we have a high degree of confidence in our results. One possible problem arises in weighting the individual jobs in the broader occupation codes. Again we had to use our knowledge of the relative numbers of each specific job in an occupation so as to get an estimated weighted average GED and SVP score for each census occupation. In most cases this posed little problem for there was little variance in GED and SVP scores across specific jobs within a census occupation code.

After each of the individual census occupations had been assigned GED, SVP, physical demands, and working conditions scores, it was necessary to group occupations into individual "Occupation Levels." This was done on the basis of narrow GED and SVP ranges. The result was a 17 level breakdown which is reported in Table A.5.

TABLE A.5

"OCCUPATION LEVELS" BASED ON GED AND SVP SCORES

Occupation Level	GED Range	SVP Range
1	1.5-2.4	1.8-2.4
2	1.5-2.4	2.5-3.4
3	1.5-2.4	3.5-4.8
4	2.5-3.4	2.0-2.4
5	2.5-3.4	2.5-3.4
6	2.5-3.4	3.5-4.4
7	2.5-3.4	4.5-5.4
8	2.5-3.4	5.5-6.4
9	2.5-3.4	6.5-8.0
10	3.5-4.4	3.0-4.4
11	3.5-4.4	4.5-5.4
12	3.5-4.4	5.5-6.4
13	3.5-4.4	6.5-7.4
14	3.5-4.4	7.5-8.0
15	4.5-5.4	6.0-7.4
16	4.5-5.4	7.5-8.0
17	5.5-6.0	7.0-8.2

Unfortunately even with nearly 14,000 cases in the SEO sample, this stratification by occupation level left individual cells often too small for statistical purposes after further stratifying by race and sex. Therefore it was necessary to reconstitute the 17 levels into a number of "occupation strata." This was the final step in preparing the occupation data for linkage to the SEO file. The final five occupation strata were grouped so that each individual stratum had the same GED range (with the exception of group 15-17) and a broader SVP range. The proviso was that each stratum have sufficiently sized cells to allow for extensive stratification and yet yield statistically significant results. The five occupation strata used in the analysis include levels 1-3, 5, 6-9, 12-14, and 15-17. Occupation level 4 was excluded because of small cell size. Occupation level 10 was excluded because it was totally dominated by a very poorly measured specific job, namely clerical and kindred workers, nec. Occupation 11 was excluded from the final analysis for the same reason, its dominant specific job being salesmen and sales clerks, nec. We were so unsure of the GED and SVP scores to attach to these broad occupation groups that we chose instead to leave them out of the analysis.

The other information collected on census occupations included median education, median age, and percent black male, black female, and white female employment. All of this came from the appropriate 1960 Census volume. It was added to the occupation file and appears along with all of the other occupation data in Table A.7. The list of Census occupations organized by occupation level with their SEO code numbers is found in Table A.6.

TABLE A.6

CENSUS OCCUPATIONS BY "OCCUPATION LEVEL"
(SEO OCCUPATION CODES)

Occupation Level 1

11974	laborers (nec)
07671	manufacturing graders and sorters
04324	messengers and office boys
07654	food, nut, and vegetable graders and packers
07693	packers and wrappers
08803	laundresses, private household
09813	attendants, recreation and amusement
09820	bootblacks
09823	chambermaids and maids
09824	charwomen and cleaners
09831	elevator operators
09874	recreation and amusement ushers
11960	carpenters' helpers
11964	gardeners and groundkeepers
11973	warehousemen (nec)
10902	farm laborers, wage workers
09841	porters

Occupation Level 2

11972	truck drivers helpers
07674	laundry and dry cleaning operators
07653	[illegible]al filers, grinders, and polishers
07673	textile knitters, loopers, and toppers
07692	oilers and greasers (excluding auto)
07710	textile spinners
09830	counter and fountain workers
09835	kitchen workers (nec)
11971	teamsters
09890	service workes (nec)
07694	painters
11963	garage laborers, car washers and greasers
07695	photographic process workers
07632	auto service and parking attendants

Occupation Level 3

11970	lumbermen, raftsmen, wood choppers
06535	upholsterers

Occupation Level 4

04315	cashiers
08801	babysitters, private household

TABLE A.6 (Continued)

Occupation Level 5

07643	manufacturer checkers, examiners
09851	guards, watchmen, doorkeepers
11965	longshoremen, stevedores
04351	telegraph messengers
07730	operatives and kindred workers (nec)
06444	log and lumber scalers and graders
09834	janitors and sextons
09875	waiters and waitresses
04304	transportation baggagemen
04323	mail carriers
04353	telephone operators
04360	typists
05383	hucksters and peddlers
07714	cab drivers and chauffeurs
09815	bartenders
04313	bill and account collectors
07631	assemblers
04320	file clerks

Occupation Level 6

07685	mine operatives and laborers (nec)
09812	attendants, professional and personal service (nec)
06494	construction and maintenance painters
09810	attendants, hospital and other institutions
09854	sheriffs and bailiffs
04350	stock clerks and storekeepers
06435	heat treaters and annealers
07640	railroad brakemen
07690	motormen--mine, factory, etc.
07704	sawyers
07705	manufacturing sewers and stitchers
07712	stationary firemen
07715	truck and tractor drivers
09842	practical nurses
04354	ticket, station, and express agents
04343	shipping and receiving clerks

Occupation Level 7

07703	sailors and deckhands
06415	cranemen, derrickmen, hoistmen
09853	policemen and detectives
07720	textile weavers
06425	road machinery operators
04341	receptionists

TABLE A.6 (Continued)

04345	stenographers
04352	telegraph operators
06404	bookbinders
06431	forgemen and hammermen
07641	bus drivers
07645	bus and streetcar conductors
07651	dressmakers and seamstresses
07670	furnacemen, smeltermen, pourers
07691	motormen--street, subway, el, RR
07713	RR switchmen
09814	barbers
09843	hairdressers and cosmetologists
Occupation Level 8	
06513	metal rollers and roll hands
07721	welders and flame-cutters
06413	cement and concrete finishers
06434	glaziers
07630	asbestos and insulation workers
07672	metal heaters
07675	meat cutters
09850	firemen, fire protection
10901	farm foremen
06512	printing pressmen and plate fitters
01015	athletes
06490	millers, grain, flour, feed, etc.
Occupation Level 9	
07613	appren. building trades (nec)
06401	bakers
06495	construction and maintenance painters
06501	paperhangers
06505	plasterers
06514	roofers and slaters
06515	shoemakers and repairers
07652	dyers
07602	appren. bricklayers and masons
06503	photoengravers and lithographers
06411	carpenters
Occupation Level 10	
04312	cashiers
04361	clerical and kindred workers, nec.
04302	library attendants and assistants
04340	postal clerks

TABLE A.6 (Continued)

Occupation Level 11

04325	office machine operators
07650	deliverymen and routemen
04305	banktellers
04310	bookkeepers
04333	payroll and timekeeping clerks
06420	decorators and window dressers
05396	salesmen and sales clerks (nec)

Occupation Level 12

02212	farmers (owners and tenants)
06492	metal molders
01180	sports instructors and officials
09825	cooks (except private household)
01185	medical and dental technicians
03252	RR conductors
04314	vehicle dispatchers and starters
04342	secretaries
05380	advertising agents and salesmen
05393	real estate agents and brokers
06402	blacksmiths
06410	cabinetmakers
06452	inspectors
04303	doctors and dentists attendants

Occupation Level 13

06545	craftsmen and kindred workers (nec)
07634	blasters and powdermen
06480	mechanics and repairmen (nec)
06453	linemen and servicemen
06523	structural metal workers
06424	engravers
01193	therapists and healers (nec)
03254	floormen and floor managers, store
06403	boilermakers
01161	photographers
02222	farm managers
03250	buyers and department heads, store
03265	ship officers, pilots, pursers
03280	postmasters
03285	purchasing agents and buyers (nec)
06421	electricians
06454	locomotive engineers
06460	locomotive fireman
06461	loom fixers

TABLE A.6 (Continued)

06471	airplane mechanics and repairmen
06472	automobile mechanics and repairmen
06473	office machine mechanics and repairmen
06474	radio and TV mechanics and repairmen
06475	RR and car shop mechanics and repairmen
06491	millwrights
06510	plumbers and pipe fitters
06520	stationary engineers
06521	stone cutters and stone carvers
06524	tailors and tailoresses
06525	tinsmiths and coppersmiths
06530	toolmakers, die makers, setters
07604	apprentice electricians
07605	apprentice toolmakers and machinists
07614	apprentice metalworking trades (nec)
07615	apprentice printing trades
07701	power station operators
06430	foremen
06465	machinists
06502	pattern and model makers
06405	brickmason and stonemasons

Occupational Level 14

06423	electrotypers and stereotypers
06451	jewelers and watchmakers
06470	mechanics and repairmen
07610	apprentice mechanics, except auto
06414	compositors and typesetters

Occupational Level 15

03260	public administration inspectors
01074	draftsmen
01104	funeral directors and embalmers
01164	radio operators
01190	electrical and electronic technician
01191	other technicians
01192	technicians (nec)
04301	agents (nec)
01072	designers
01154	personnel and labor relations workers
01182	teachers--elementary schools
05395	stock and bond salesmen
07642	surveying chainmen, rodmen, axmen
01102	farm and home management advisors
01111	librarians

TABLE A.6 (Continued)

01150	professional nurses
01160	pharmacists
01163	public relations men
01174	statiticians and actuaries
01181	surveyors
01183	teachers--secondary schools
01184	teachers (nec)
03251	buyers and shippers, farm products
03262	building managers and superintendents
01090	metallurgical engineers
01084	industrial engineers
01093	engineers (nec)
01012	airplane pilots and navigators
05385	insurance agents and brokers
Occupation Level 16	
01014	artists and art teachers
01073	dieticians and nutritionists
01171	social and welfare workers
01001	accountants and auditors
01120	musicians and music teachers
03253	credit men
03275	official--Lodge, Society, union
04321	insurance investigators
01085	mechanical engineers
01082	civil engineers
01170	religious workers
01091	mining engineers
01080	aeronautical engineers
01075	editors and reporters
01083	electrical engineers
01165	recreation and group workers
Occupation Level 17	
01020	authors
03270	public administration officials--administrators
01173	psychologists
01030	college presidents and deans
01103	foresters and conservationists
01013	architects
01021	chemists
01023	clergymen
01031	faculty--agricultural sciences
01032	faculty--biological sciences

TABLE A.6 (Continued)

01034	faculty--chemistry
01035	faculty--economics
01040	faculty--engineering
01041	faculty--geology and geophysics
01042	faculty--mathematics
01043	faculty--medical sciences
01045	faculty--physics
01050	faculty--psychology
01053	faculty--social sciences, (nec)
01054	faculty--non-scientific subjects
01060	faculty--subject not specified
01071	dentists
01081	chemical engineers
01105	lawyers and judges
01130	agricultural scientists
01131	biological scientists
01134	geologists and geophysicists
01135	mathematicians
01140	physicists
01145	miss. natural scientists
01162	physicians and surgeons
01194	veterinarians
01172	economists

The columns in Table A.7 refer to the following:

Column	Datum
1	SEO Census Occupation Code
2	Physical Demands
3	Number of Negative Working Condition Traits
4	GED SCORE
5	SVP SCORE
6	Median Years of Schooling--Males
7	Median Years of Schooling--Females
8	Median Age--Males
9	Median Age--Females
10	Imputed "Occupation Level"
11	Percent Black Male Employment
12	Percent White Female Employment
13	Percent Black Female Employment

TABLE A.7

OCCUPATION DATA BY SEO OCCUPATION CODE

(1)	——	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
10000		********	********	********	********	********	********	********	********	********	********	********	********
10395		********	********	********	********	********	********	********	********	********	********	********	********
11001		1.	0.	5.0	8.0	15.3	12.8	40.0	42.6	16.	0.005	0.162	0.003
11010		2.	0.	5.0	7.0	14.1	13.1	38.2	38.1	15.	0.013	0.346	0.014
11012		2.	2.	5.0	7.0	13.5	********	38.3	********	15.	0.003	0.008	0.001
11013		1.	0.	6.0	5.0	16.8	********	41.7	********	17.	0.005	0.021	0.0
11014		2.	0.	4.5	7.5	13.7	15.1	37.8	38.3	16.	0.011	0.341	0.008
11015		3.	0.	3.3	5.5	12.5	********	28.9	********	6.	0.058	0.075	0.005
11020		1.	0.	5.5	7.5	15.6	16.0	38.9	44.3	17.	0.007	0.275	0.004
11021		2.	0.	6.0	8.0	16.6	16.5	37.0	33.7	17.	0.019	0.076	0.003
11022		3.	0.	5.0	7.0	16.5	15.2	45.3	58.3	15.	0.009	0.091	0.0
11023		2.	0.	6.0	6.0	17.1	12.8	43.2	48.7	17.	0.067	0.019	0.003
11030		1.	0.	5.8	6.2	17.4	17.4	47.7	45.4	17.	0.039	0.216	0.015
1031		2.	0.	6.0	8.0	17.4	17.4	42.0	********	17.	0.038	0.006	0.0
1032		2.	0.	6.0	8.0	17.4	17.4	39.2	34.9	17.	0.024	0.155	0.006
1034		2.	0.	6.0	8.0	17.4	17.4	37.7	********	17.	0.011	0.111	0.006
1035		2.	0.	6.0	8.0	17.4	17.4	40.4	********	17.	0.012	0.061	0.006
1040		2.	0.	6.0	8.0	17.4	17.4	38.3	********	17.	0.014	0.020	0.002
1041		2.	0.	6.0	8.0	17.4	17.4	36.3	********	17.	0.013	0.026	0.0
1042		2.	0.	6.0	8.0	17.4	17.4	34.8	43.7	17.	0.015	0.141	0.013
1043		2.	0.	6.0	6.0	17.4	17.4	40.6	40.1	17.	0.020	0.163	0.007
1045		2.	0.	6.0	8.0	17.4	17.4	35.0	********	17.	0.013	0.036	0.003
1050		2.	0.	6.0	8.0	17.4	17.4	37.0	********	17.	0.010	0.204	0.009
1051		2.	0.	6.0	8.0	17.4	17.4	********	********	17.	0.0	0.082	0.0
1052		2.	0.	6.0	8.0	17.4	17.4	********	********	17.	0.0	0.043	0.0
1053		2.	0.	6.0	8.0	17.4	17.4	40.8	45.6	17.	0.020	0.279	0.020
1054		2.	0.	6.0	8.0	17.4	17.4	40.3	44.6	17.	0.016	0.292	0.013
1060		2.	0.	6.0	8.0	17.4	17.4	38.9	41.7	17.	0.024	0.219	0.018
1070		2.	0.	4.5	7.0	12.5	12.5	29.4	28.9	15.	0.008	0.758	0.016
1071		1.	0.	6.0	8.0	17.3	16.0	45.9	44.5	17.	0.026	0.020	0.001
1072		1.	0.	4.5	7.4	13.5	13.0	37.3	41.9	15.	0.008	0.178	0.003
1073		2.	0.	4.5	7.5	12.7	13.2	36.3	44.1	16.	0.017	0.789	0.128
1074		1.	0.	4.5	7.0	12.9	12.9	31.1	35.7	15.	0.010	0.057	0.001
1075		1.	0.	5.4	7.5	16.0	14.6	39.4	39.5	16.	0.005	0.363	0.003
1080		2.	0.	5.3	7.7	16.3	13.9	35.9	39.7	16.	0.006	0.015	0.0
1081		1.	0.	6.0	8.0	16.7	13.9	36.1	39.7	17.	0.001	0.014	0.0
1082		2.	0.	5.1	8.0	16.1	13.9	40.3	39.7	16.	0.008	0.004	0.0
1083		2.	0.	5.4	7.8	16.2	15.2	36.3	34.8	16.	0.005	0.009	0.0
1084		1.	0.	5.1	7.3	15.2	12.8	39.0	43.0	15.	0.003	0.023	0.0
1085		1.	0.	5.1	7.8	16.1	13.9	38.8	39.7	16.	0.003	0.003	0.0
1090		2.	0.	5.0	7.4	15.3	13.9	38.6	39.7	15.	0.007	0.015	0.0
1091		2.	2.	5.2	8.0	16.5	13.9	36.9	39.7	16.	0.003	0.002	0.0
1092		********	********	********	********	********	********	********	********	********	********	********	********
1093		2.	0.	5.2	7.2	16.0	13.9	37.7	39.7	15.	0.007	0.009	0.0
1101		********	********	********	********	********	********	********	********	********	********	********	********
1102		2.	0.	5.0	7.0	16.8	16.5	38.2	36.9	15.	0.039	0.493	0.035
1103		2.	0.	6.0	7.9	12.8	********	39.6	********	17.	0.008	0.027	0.001
1104		4.	2.	4.5	7.0	13.4	12.7	42.8	53.8	15.	0.081	0.051	0.010
1105		1.	0.	6.0	8.0	17.4	17.0	45.3	45.7	17.	0.011	0.034	0.001
1111		2.	0.	5.0	7.0	16.7	16.2	34.0	45.8	15.	0.006	0.810	0.039
1120		1.	0.	5.0	8.0	14.3	14.8	36.2	43.2	16.	0.028	0.542	0.020
1130		2.	0.	6.0	8.0	16.6	16.5	38.9	33.5	17.	0.020	0.061	0.0
1131		2.	0.	6.0	8.0	16.6	16.5	36.3	32.7	17.	0.025	0.250	0.016
1134		2.	0.	6.0	8.0	16.3	16.5	35.5	33.5	17.	0.001	0.030	0.0
1135		1.	0.	6.0	8.0	17.1	16.4	31.3	29.5	17.	0.030	0.244	0.022
1140		2.	0.	6.0	8.0	17.2	16.5	34.2	33.5	17.	0.010	0.039	0.004
1145		2.	0.	6.0	8.0	17.2	16.5	38.5	33.5	17.	0.0	0.109	0.0

TABLE A.7 (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1150	2.	0.	5.0	7.0	13.0	13.2	40.5	39.1	15.	0.003	0.914	0.054
1151	********	********	********	********	********	********	********	********	********	********	********	********
1152	1.	0.	5.0	7.0	17.0	********	41.6	********	15.	0.001	0.040	0.003
1153	3.	0.	6.0	8.0	17.3	********	43.9	********	17.	0.005	0.103	0.005
1154	1.	0.	5.0	6.5	15.9	13.1	41.2	41.9	15.	0.008	0.293	0.008
01160	2.	0.	5.0	7.0	16.2	16.2	45.4	39.1	15.	0.017	0.078	0.002
01161	2.	0.	4.0	7.0	12.6	12.4	39.2	40.8	13.	0.019	0.116	0.003
01162	2.	0.	6.0	8.0	17.5	17.4	43.1	41.6	17.	0.020	0.061	0.002
01163	1.	0.	5.0	7.0	16.1	15.4	41.3	36.7	15.	0.036	0.233	0.004
01164	1.	0.	4.5	7.0	12.6	12.3	35.3	38.3	15.	0.011	0.098	0.004
01165	1.	0.	5.4	7.5	15.1	14.7	31.0	33.8	16.	0.044	0.375	0.049
01170	1.	0.	5.2	7.6	16.3	13.4	37.7	45.5	16.	0.012	0.599	0.015
01171	1.	0.	5.0	7.5	16.6	16.5	38.5	44.9	16.	0.041	0.561	0.069
01172	1.	0.	6.0	7.0	16.8	15.9	39.6	39.7	17.	0.010	0.131	0.005
01173	1.	0.	5.8	7.8	17.5	17.4	35.4	39.9	17.	0.012	0.300	0.009
01174	1.	0.	5.0	7.0	16.1	13.0	38.9	40.6	15.	0.014	0.304	0.007
01175	1.	0.	6.0	7.0	17.0	16.5	40.2	43.6	17.	0.033	0.261	0.005
01180	3.	0.	3.5	6.0	16.5	16.5	33.0	31.8	12.	0.035	0.308	0.016
01181	2.	0.	5.6	7.0	12.5	12.7	31.6	37.3	15.	0.007	0.036	0.001
01182	2.	0.	5.0	6.5	17.0	16.4	34.4	44.5	15.	0.014	0.777	0.077
01183	2.	0.	5.0	7.0	17.2	16.8	36.9	41.8	15.	0.023	0.434	0.036
01184	2.	0.	5.0	7.0	16.4	16.1	37.4	43.2	15.	0.018	0.571	0.037
01185	2.	0.	4.0	6.0	12.8	13.2	34.1	31.3	12.	0.037	0.575	0.042
01190	2.	0.	4.5	7.0	12.7	12.3	30.7	36.9	15.	0.019	0.046	0.033
01191	2.	0.	4.5	7.0	12.8	12.6	32.7	36.3	15.	0.014	0.122	0.004
01192	2.	0.	4.5	7.0	12.8	12.7	32.9	35.9	15.	0.030	0.220	0.015
01193	2.	0.	4.0	6.5	16.4	16.1	42.3	38.7	13.	0.031	0.505	0.024
01194	2.	1.	6.0	8.0	17.4	********	39.2	********	17.	0.017	0.018	0.0
01195	********	********	********	********	********	********	********	********	********	********	********	********
02212	4.	0.	3.5	5.5	8.7	8.8	43.2	51.7	12.	0.063	0.040	0.006
02222	2.	0.	4.0	7.0	11.5	********	43.5	********	13.	0.024	0.0[illegible]	0.002
03250	1.	0.	4.0	7.0	12.6	12.4	40.9	45.3	13.	0.004	0.217	0.002
03251	2.	0.	5.0	7.0	11.0	********	48.8	********	15.	0.008	0.017	0.001
03252	2.	1.	4.0	6.0	10.5	********	51.3	********	12.	0.005	0.003	0.0
03253	1.	0.	5.0	8.0	13.3	12.5	38.0	42.9	16.	0.004	0.239	0.0
03254	1.	0.	4.0	6.5	12.4	11.5	38.5	42.7	13.	0.018	0.472	0.021
03260	2.	1.	4.5	6.5	12.4	12.4	45.4	47.8	15.	0.018	0.042	0.005
03262	2.	0.	5.0	7.0	9.8	11.1	54.7	56.0	15.	0.081	0.361	0.018
03265	2.	1.	4.0	7.0	10.5	********	45.7	********	13.	0.007	0.003	0.001
03270	1.	0.	5.5	7.5	12.9	12.7	48.3	47.6	17.	0.010	0.186	0.006
03275	1.	0.	5.0	8.0	12.1	12.5	47.7	46.8	16.	0.023	0.099	0.001
03280	1.	0.	4.0	7.0	12.5	12.3	50.5	52.0	13.	0.001	0.382	0.001
03285	1.	0.	4.0	7.0	12.9	12.6	42.2	42.8	13.	0.005	0.392	0.002
03290	********	********	********	********	********	********	********	********	********	********	********	********
04301	2.	0.	4.5	7.0	12.7	12.5	43.3	45.4	15.	0.011	0.174	0.005
04302	3.	0.	4.0	4.0	13.7	13.1	22.1	31.1	10.	0.019	0.707	0.045
04303	2.	1.	4.2	6.0	12.5	12.5	31.2	32.7	12.	0.003	0.937	0.029
04304	3.	0.	3.0	3.0	10.9	********	42.5	********	5.	0.182	0.019	0.004
04305	2.	0.	4.0	5.0	18.7	12.5	30.6	32.7	11.	0.003	0.686	0.002
04310	1.	0.	4.0	5.0	12.7	12.5	38.9	39.0	11.	0.002	0.823	0.007
04312	1.	0.	3.5	3.0	12.0	12.0	26.7	36.7	10.	0.007	0.756	0.024
04313	2.	0.	3.2	3.0	12.3	12.3	37.8	42.0	5.	0.019	0.180	0.010
04314	1.	0.	4.0	6.0	12.0	12.0	40.5	40.2	12.	0.021	0.100	0.011
04315	4.	0.	3.0	2.0	12.2	********	47.5	********	4.	0.084	0.020	0.006
04320	2.	0.	3.0	3.0	12.4	12.2	27.4	29.8	5.	0.016	0.793	0.055
04321	1.	0.	5.0	8.0	14.0	12.6	34.8	35.3	16.	0.004	0.121	0.003
04323	3.	0.	3.0	3.0	12.3	12.2	40.3	43.2	5.	0.101	0.019	0.002
04324	2.	0.	2.0	2.0	10.0	11.8	23.7	19.7	1.	0.125	0.158	0.014
04325	2.	0.	3.5	4.5	12.0	12.8	26.1	30.8	11.	0.011	0.702	0.032
04333	1.	0.	4.0	5.0	12.5	12.4	40.3	38.7	11.	0.006	0.583	0.010

TABLE A.7 (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
04340	2.	0.	4.0	4.0	12.5	12.4	40.8	45.2	10.	0.144	0.151	0.028
04341	1.	0.	3.0	5.0	12.5	12.5	39.5	33.5	7.	0.002	0.945	0.025
04342	1.	0.	4.0	6.0	12.0	12.6	43.8	38.4	12.	0.001	0.953	0.014
04343	3.	0.	3.0	3.5	13.9	11.5	36.7	39.0	6.	0.100	0.076	0.010
04345	1.	0.	3.0	5.0	12.6	12.6	38.3	32.9	7.	0.002	0.927	0.019
04350	1.	0.	3.0	4.0	11.4	12.0	34.6	39.3	6.	0.081	0.126	0.022
04351	2.	0.	2.5	3.0	10.4	********	19.8	********	5.	0.167	0.060	0.014
04352	1.	0.	3.0	5.0	12.2	12.3	40.0	44.6	7.	0.005	0.215	0.001
04353	1.	0.	3.0	3.0	12.3	12.2	37.0	35.7	5.	0.002	0.932	0.023
04354	2.	0.	3.2	4.0	12.5	12.7	40.0	29.8	6.	0.006	0.219	0.001
04360	1.	0.	3.0	3.0	12.5	12.5	28.6	29.0	5.	0.004	0.885	0.055
04361	1.	0.	3.8	4.2	12.4	12.4	38.8	38.2	10.	0.017	0.565	0.022
05380	2.	0.	4.0	6.0	13.3	12.8	39.8	39.7	12.	0.004	0.150	0.001
05381	2.	0.	3.0	6.0	11.6	********	47.0	********	8.	0.0	0.023	0.0
05382	2.	0.	3.0	3.0	12.0	12.1	37.3	38.8	5.	0.002	0.919	0.007
05383	3.	0.	3.0	3.0	10.2	12.1	45.9	41.3	5.	0.028	0.548	0.020
05385	1.	0.	4.7	6.0	12.3	12.6	40.2	43.6	15.	0.014	0.095	0.006
05390	2.	0.	3.0	2.0	9.0	10.0	15.7	21.7	4.	0.041	0.042	0.001
05393	2.	0.	4.0	6.0	12.7	12.6	50.4	48.7	12.	0.013	0.228	0.006
05395	2.	0.	5.0	6.5	14.5	12.8	44.1	47.1	15.	0.005	0.060	0.0
05396	2.	0.	4.2	5.0	12.3	11.5	39.7	43.0	11.	0.009	0.398	0.009
06401	3.	1.	3.0	7.3	9.2	9.7	42.2	45.5	9.	0.062	0.136	0.021
06402	4.	2.	4.0	6.0	8.5	********	51.1	********	12.	0.029	0.006	0.0
06403	4.	2.	4.0	6.5	9.6	********	45.2	********	13.	0.026	0.001	0.0
06404	2.	0.	3.0	5.0	10.7	9.9	38.4	43.4	7.	0.029	0.512	0.030
06405	3.	2.	3.5	7.3	9.7	********	38.0	********	13.	0.121	0.003	0.001
06410	2.	0.	4.0	6.0	10.0	********	43.0	********	12.	0.026	0.012	0.001
06411	3.	2.	3.0	7.0	9.3	10.0	43.7	36.7	9.	0.045	0.003	0.0
06413	3.	2.	3.0	6.0	8.6	********	40.2	********	6.	0.279	0.002	0.0
06414	2.	0.	4.0	8.0	12.1	12.2	40.3	40.5	14.	0.020	0.083	0.004
06415	2.	1.	3.0	4.5	8.9	********	41.9	********	7.	0.097	0.004	0.001
06420	3.	0.	4.0	5.0	12.3	12.4	38.5	41.5	11.	0.023	0.428	0.028
06421	3.	1.	4.0	7.0	11.8	11.6	41.0	41.5	13.	0.014	0.007	0.0
06423	3.	2.	3.5	8.0	11.7	********	41.8	********	14.	0.004	0.007	0.0
06424	2.	0.	3.8	7.0	12.0	11.0	39.8	40.1	13.	0.021	0.184	0.009
06425	3.	1.	3.0	4.9	9.1	********	39.9	********	7.	0.037	0.004	0.0
06430	2.	2.	4.0	7.2	11.5	10.9	44.7	44.6	13.	0.014	0.066	0.002
06431	4.	2.	3.0	5.0	8.3	********	43.5	********	7.	0.063	0.038	0.003
06432	1.	0.	4.0	7.0	10.0	********	50.9	********	13.	0.027	0.181	0.0
06434	3.	0.	3.0	6.0	10.6	********	35.7	********	8.	0.032	0.022	0.0
06435	3.	3.	3.0	4.0	9.4	********	44.1	********	6.	0.069	0.017	0.002
06444	3.	1.	2.7	3.1	9.9	10.8	43.7	37.9	5.	0.083	0.044	0.009
06450	********	********	********	********	********	********	********	********	********	********	********	********
06451	1.	0.	4.0	7.5	11.3	10.5	44.4	39.6	14.	0.010	0.060	0.009
06452	3.	0.	4.0	6.0	9.9	********	41.4	********	12.	0.021	0.008	0.001
06453	4.	1.	3.8	6.5	12.3	12.1	33.7	39.5	13.	0.011	0.019	0.001
06454	2.	1.	4.0	7.0	9.8	********	54.2	********	13.	0.002	0.002	0.0
[redacted]	2.	1.	4.0	7.0	11.7	********	39.2	********	13.	0.023	0.003	0.0
[redacted]	4.	1.	4.0	7.0	8.1	********	43.5	********	13.	0.002	0.008	0.001
06465	3.	0.	4.0	7.2	10.8	10.1	42.3	39.5	13.	0.025	0.013	0.001
06470	4.	3.	4.0	7.5	11.1	********	40.3	********	14.	0.021	0.003	0.001
06471	3.	1.	4.0	7.0	12.2	11.6	37.7	41.9	13.	0.027	0.014	0.001
06472	3.	2.	4.0	7.0	9.3	10.6	38.4	32.2	13.	0.066	0.003	0.001
06473	2.	0.	4.0	7.0	12.4	********	31.9	********	13.	0.012	0.011	0.001
06474	3.	0.	4.0	7.0	12.2	11.9	35.5	40.2	13.	0.042	0.015	0.002
06475	4.	2.	4.0	7.0	9.1	********	47.0	********	13.	0.043	0.001	0.0
06480	3.	0.	3.7	6.8	10.4	10.6	42.2	44.0	13.	0.053	0.015	0.002
06490	2.	2.	3.3	6.2	8.9	********	43.9	********	8.	0.065	0.005	0.0
06491	4.	1.	4.0	7.0	9.7	********	45.0	********	13.	0.019	0.001	0.0
06492	3.	1.	3.5	5.5	8.8	10.3	41.0	38.7	12.	0.222	0.025	0.002

TABLE A.7 (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
06493	2.	2.	4.0	6.0	10.5	********	47.1	********	12.	0.030	0.022	0.001
06494	1.	0.	2.8	3.9	12.0	11.4	39.9	40.3	6.	0.014	0.145	0.007
06495	2.	1.	3.0	7.0	9.1	11.7	45.5	41.9	9.	0.068	0.018	0.002
06501	3.	1.	3.0	7.0	8.8	8.8	51.3	47.9	9.	0.108	0.126	0.002
06502	3.	1.	4.0	7.4	12.0	********	42.2	********	13.	0.007	0.016	0.001
06503	2.	0.	3.2	7.2	12.2	12.0	38.8	39.2	9.	0.011	0.051	0.001
06504	1.	0.	4.0	7.0	11.9	********	50.7	********	13.	0.012	0.032	0.0
06505	4.	2.	3.0	7.0	9.0	********	40.5	********	9.	0.166	0.003	0.001
06510	4.	1.	4.0	7.0	10.2	10.5	42.6	44.7	13.	0.032	0.003	0.0
06512	3.	1.	3.2	6.2	11.5	11.1	38.0	38.7	8.	0.018	0.039	0.003
06513	3.	3.	3.0	5.5	9.2	9.8	42.9	40.0	8.	0.118	0.034	0.003
06514	3.	1.	3.0	7.0	8.9	********	36.9	********	9.	0.099	0.001	0.0
06515	2.	0.	3.0	7.0	8.4	9.5	51.5	48.3	9.	0.132	0.036	0.004
06520	3.	3.	4.0	7.0	12.2	12.5	44.0	42.3	13.	0.017	0.006	0.0
06521	3.	3.	4.0	7.0	8.8	********	45.6	********	13.	0.042	0.012	0.0
06523	3.	2.	3.8	6.5	10.0	********	41.2	********	13.	0.037	0.005	0.0
06524	2.	1.	4.0	7.0	8.4	8.9	57.9	51.4	13.	0.053	0.194	0.014
06525	3.	2.	4.0	7.0	10.8	11.0	39.4	42.6	13.	0.016	0.011	0.001
06530	3.	0.	4.0	7.0	11.7	11.4	42.3	41.6	13.	0.009	0.007	0.0
06535	2.	0.	2.0	3.5	9.7	9.4	39.4	42.0	3.	0.044	0.099	0.006
06545	2.	1.	3.5	7.0	10.2	10.3	39.4	40.5	13.	0.056	0.018	0.001
06555	*****	*****	*****	*****	********	********	********	********	*****	******	******	******
07601	3.	2.	4.0	7.0	11.3	********	19.7	********	13.	0.023	0.023	0.0
07602	3.	1.	3.0	8.0	11.5	********	23.0	********	9.	0.107	0.006	0.0
07603	3.	2.	4.0	7.0	12.0	********	21.7	********	13.	0.018	0.0	0.0
07604	3.	1.	4.0	7.0	12.4	********	23.9	********	13.	0.009	0.013	0.0
07605	3.	2.	4.0	7.0	12.1	********	23.1	********	13.	0.017	0.019	0.0
07610	4.	3.	4.0	7.5	12.2	********	23.4	********	14.	0.017	0.038	0.0
07612	4.	2.	4.0	7.5	12.2	********	23.4	********	14.	0.007	0.0	0.0
07613	3.	1.	3.0	6.5	10.8	********	21.6	********	9.	0.067	0.029	0.007
07614	4.	1.	4.0	7.0	12.2	********	23.5	********	13.	0.025	0.007	0.0
07615	2.	1.	4.0	7.0	12.2	********	22.6	********	13.	0.018	0.034	0.0
07620	*****	*****	*****	*****	********	********	********	********	*****	******	******	******
07621	*****	*****	*****	*****	********	********	********	********	*****	******	******	******
07630	2.	3.	3.0	6.0	10.4	********	37.7	********	8.	0.022	0.022	0.003
07631	3.	0.	2.5	3.0	10.3	10.4	38.6	39.1	5.	0.040	0.424	0.023
07632	3.	0.	2.4	2.8	10.5	10.5	25.3	37.8	2.	0.092	0.019	0.002
07634	4.	3.	3.5	7.0	8.7	********	42.0	********	13.	0.117	0.009	0.0
07635	2.	0.	3.0	5.0	8.9	********	43.7	********	7.	0.026	0.008	0.0
07640	3.	2.	3.0	4.0	10.8	********	41.0	********	6.	0.031	0.001	0.0
07641	3.	1.	3.0	5.0	9.8	11.7	44.9	40.6	7.	0.090	0.092	0.005
07642	2.	0.	5.0	6.8	11.7	********	25.3	********	15.	0.044	0.025	0.002
07643	2.	0.	2.5	2.5	11.6	10.2	40.5	41.4	5.	0.019	0.437	0.019
07645	3.	1.	3.0	5.0	10.2	********	47.0	********	7.	0.256	0.009	0.0
07650	3.	0.	3.8	4.8	11.0	11.1	33.6	38.7	11.	0.080	0.024	0.002
07651	2.	0.	3.0	5.0	8.8	9.5	50.5	55.3	7.	0.004	0.879	0.075
07652	3.	3.	3.0	7.0	8.9	********	39.6	********	9.	0.091	0.023	0.007
07653	3.	1.	2.0	3.0	9.4	10.1	41.7	40.7	2.	0.077	0.056	0.003
07654	2.	0.	2.0	2.0	8.2	8.6	37.6	41.1	1.	0.033	0.641	0.058
07670	3.	3.	3.0	5.0	8.9	********	41.7	********	7.	0.240	0.015	0.001
07671	2.	0.	1.8	2.0	8.9	9.1	40.4	42.7	1.	0.035	0.611	0.077
07672	3.	3.	3.0	6.0	8.9	********	45.5	********	8.	0.095	0.010	0.005
07673	2.	0.	2.0	3.0	9.0	9.2	37.5	36.6	2.	0.007	0.666	0.011
07674	2.	2.	2.0	2.5	9.4	8.9	40.8	42.3	2.	0.096	0.442	0.262
07675	3.	1.	3.0	6.0	10.7	10.0	41.2	40.5	8.	0.039	0.027	0.004
07680	2.	0.	4.0	6.0	********	9.8	********	54.5	12.	0.009	0.850	0.060
07685	4.	2.	2.5	3.5	8.0	9.7	40.5	37.1	6.	0.044	0.004	0.0
07690	2.	0.	3.0	4.3	8.3	********	43.7	********	6.	0.106	0.001	0.003
07691	3.	1.	3.0	5.0	9.8	********	48.0	********	7.	0.132	0.011	0.005
07692	3.	0.	2.0	3.0	8.9	********	41.1	********	2.	0.077	0.006	0.001

TABLE A.7 (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
07693	3.	1.	2.0	2.0	9.5	9.7	31.6	38.8	1.	0.062	0.555	0.052
07694	3.	1.	2.2	2.9	9.2	9.9	38.5	39.1	2.	0.102	0.090	0.010
07695	2.	0.	2.3	3.3	12.1	11.9	33.2	38.9	2.	0.030	0.399	0.017
07701	2.	0.	4.0	7.0	12.1	8.9	44.1	40.8	13.	0.010	0.054	0.002
07703	4.	1.	2.8	4.5	9.3	********	39.2	********	7.	0.103	0.008	0.001
07704	3.	1.	3.0	4.0	8.3	9.1	40.3	38.2	6.	0.171	0.022	0.004
07705	2.	0.	3.0	4.0	8.6	8.9	44.2	42.3	6.	0.005	0.881	0.045
07710	2.	1.	2.0	3.0	8.6	7.7	43.0	42.3	2.	0.001	0.799	0.002
07712	3.	4.	3.0	4.0	8.8	********	47.5	********	6.	0.121	0.005	0.0
07713	2.	0.	3.0	5.0	11.1	********	39.9	********	7.	0.027	0.003	0.0
07714	3.	0.	3.0	3.0	9.2	11.1	45.4	42.6	5.	0.183	0.022	0.004
07715	3.	0.	3.0	4.0	9.1	10.4	37.7	36.3	6.	0.139	0.004	0.001
07720	2.	1.	3.0	4.8	8.4	8.6	40.4	43.3	7.	0.005	0.418	0.002
07721	4.	3.	3.0	5.8	9.7	10.5	39.8	36.5	8.	0.058	0.044	0.002
07730	2.	0.	2.5	3.0	9.4	9.3	38.6	40.2	5.	0.074	0.267	0.028
08801	2.	0.	3.0	2.0	9.5	9.6	16.2	24.9	4.	0.001	0.874	0.094
08802	2.	0.	4.0	6.0	8.5	8.6	52.8	53.4	12.	0.004	0.688	0.286
08803	2.	0.	2.0	2.0	********	7.7	********	52.0	1.	0.008	0.478	0.488
08804	2.	0.	2.5	2.5	8.4	8.4	49.4	45.1	5.	0.022	0.293	0.658
09810	3.	0.	3.0	3.5	10.6	10.8	37.1	39.4	6.	0.080	0.564	0.169
09812	3.	1.	2.8	3.8	11.1	11.2	34.1	39.0	6.	0.041	0.479	0.224
09813	2.	0.	2.0	2.0	9.3	11.1	19.8	35.3	1.	0.106	0.118	0.009
09814	2.	0.	3.0	5.0	9.2	11.3	48.9	39.7	7.	0.082	0.017	0.010
09815	2.	0.	3.0	3.0	10.1	10.4	45.2	42.4	5.	0.046	0.103	0.003
09820	2.	0.	2.0	2.0	8.2	********	32.9	********	1.	0.561	0.020	0.014
09821	3.	0.	4.0	6.0	10.2	10.0	56.9	52.7	12.	0.008	0.818	0.063
09823	2.	1.	2.0	2.0	8.5	8.7	42.4	44.1	1.	0.010	0.376	0.597
09824	3.	0.	2.0	2.0	8.9	8.5	37.6	48.0	1.	0.081	0.408	0.180
09825	3.	2.	3.7	6.0	9.4	9.0	43.0	47.4	12.	0.077	0.487	0.145
09830	2.	0.	2.0	3.0	10.9	10.3	24.7	40.2	2.	0.028	0.630	0.083
09831	3.	0.	2.0	2.0	8.6	10.5	51.6	38.8	1.	0.157	0.177	0.145
09832	3.	1.	4.0	7.0	11.0	10.7	45.5	51.3	13.	0.031	0.718	0.075
09834	3.	0.	2.8	2.8	8.6	8.7	50.3	49.3	5.	0.249	0.096	0.029
09835	3.	2.	2.0	3.0	9.0	8.9	27.6	43.5	2.	0.106	0.421	0.161
09840	3.	0.	3.0	4.0	********	********	********	********	6.	0.085	0.080	0.551
09841	3.	0.	2.0	2.0	8.3	9.7	43.4	38.7	1.	0.734	0.007	0.011
09842	3.	1.	3.0	4.0	11.3	11.1	44.9	48.5	6.	0.007	0.799	0.154
09843	2.	0.	3.3	5.0	12.0	12.1	37.6	39.3	7.	0.006	0.774	0.108
09850	5.	5.	3.0	6.0	12.1	********	38.6	********	8.	0.019	0.002	0.004
09851	2.	1.	2.5	2.5	8.9	11.8	53.0	43.7	5.	0.051	0.026	0.003
09852	********	********	********	********	********	********	********	********	********	********	********	********
09853	3.	1.	3.0	4.5	12.1	12.3	38.2	39.5	7.	0.034	0.025	0.003
09854	2.	0.	3.0	3.5	12.0	12.3	45.5	48.9	6.	0.025	0.049	0.002
09860	2.	1.	2.8	3.3	8.5	11.2	60.8	41.9	5.	0.025	0.399	0.060
09874	2.	0.	2.0	2.0	10.5	10.8	17.7	17.8	1.	0.030	0.298	0.009
09875	2.	0.	2.8	3.0	10.7	10.6	34.6	33.8	5.	0.031	0.808	0.052
09880	2.	0.	2.2	2.5	10.0	9.7	27.6	44.5	2.	0.145	0.335	0.096
10901	2.	0.	3.0	6.0	9.0	********	45.9	********	8.	0.038	0.012	0.0
10902	4.	0.	2.0	2.0	7.9	7.5	33.7	36.1	1.	0.200	0.055	0.058
10903	3.	0.	2.0	2.0	9.4	9.1	18.4	42.8	1.	0.071	0.388	0.047
10905	3.	0.	3.0	5.0	9.4	9.1	18.4	42.8	7.	0.021	0.017	0.0
11960	4.	1.	2.0	2.0	8.4	********	31.8	********	1.	0.240	0.005	0.002
11962	4.	2.	2.0	4.0	8.3	********	42.5	********	3.	0.092	0.008	0.002
11963	3.	1.	2.3	3.0	9.4	9.5	26.0	26.6	2.	0.422	0.018	0.016
11964	3.	0.	2.0	2.0	8.5	8.9	42.5	43.5	1.	0.197	0.012	0.004
11965	5.	0.	2.5	2.5	8.4	********	44.7	********	5.	0.351	0.003	0.002
11970	4.	2.	2.3	4.8	7.9	8.3	36.6	34.5	3.	0.291	0.005	0.003
11971	3.	0.	2.0	3.0	7.8	********	40.0	********	2.	0.285	0.002	0.003
11972	5.	2.	1.5	2.5	8.6	********	31.9	********	2.	0.289	0.007	0.003
11973	3.	0.	2.0	2.0	10.7	10.5	37.1	38.2	1.	0.130	0.013	0.003
11974	4.	2.	1.8	1.8	8.7	9.5	37.1	38.2	1.	0.239	0.032	0.009

Construction of the Industry Data Base

Data on industry characteristics were gathered from numerous sources including the Internal Revenue Service's Corporation Source Book of Statistics of Income; the Department of Labor's Employment and Earnings for the United States 1909-1968; the United States Census volume on "Industry Characteristics"; and the Department of Commerce's Census of Manufacturers and Mineral Industries and the Input-Output Matrix for 1958.[7]

Each of these sources were fully investigated and dozens of industry characteristics were computed before choosing the final set of characteristics included in the regression analysis. Again there was a problem of matching identification codes for at least four different coding systems are used in compiling industry information: the Standard Industrial Classification (SIC), the Standard Enterprise Classification (SEC), the SEO survey codes, and the 81 industry breakdown used in the 1958 Input-Output matrix. It was necessary to rely on industry titles to merge the several sources of data, again checking with manpower experts to see that our conversion routine was proper. This was made all the more difficult because of changes in classification over time even within the same data source. In a good number of cases, for instance, the Statistics of Income had different codes for apparently the same industry in 1965, 1958, and 1953. Data was collected for several points in time, namely 1953, 1958, 1961, and 1965 in order to obtain "historical" information on such factors as concentration and after-tax profits. In theory wages should be related to long run industry performance, not fluctuations in such variables. The years chosen reflect different points in the business cycle in the post-war period with 1958 and 1961 being recession years and 1953 and 1965 being years of relatively low unemployment.

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[7] U.S. Department of the Treasury, Internal Revenue Service, Corporation Source Book of Statistics of Income: 1953, 1958, 1961, 1965 (Washington, D.C.: Government Printing Office); U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings for the United States 1909-1968 (Washington, D.C.: Government Printing Office, 1968); U.S. Census Bureau, United States Census of Population: 1960, "Industry Characteristics," Series PC(2) 7, 1966; U.S. Department of Commerce, Census of Manufacturers and Mineral Industries: 1953, 1958, 1963 (Washington, D.C.: Government Printing Office); and Wassily W. Leontief, "The Structure of the U.S. Economy," Sciehtific American, April 1965.

With the exception of the Source Book of Statistics of Income, all of these sources are relatively well known to research economists.[8]

> The Corporation Source Book is a set of unpublished worksheet tables that form the basis for the annually published reports, Statistics of Income, Corporation Income Tax Returns. Beginning with 1942, the Source Book provides detailed industry group financial statistics by asset size class. No Source Book was produced for 1952, and for 1962, distribution by asset size class was provided only for major industry groups.
>
> Assets, liabilities, income, deductions, tax liability and distributions to stockholders are provided for about 235 industry groups. (These are broken down for each industry) into 13 to 16 columns providing a total column and size classes ranging from zero assets to assets of $250,000,000 or more.

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[8] Corporation Source Book of Statistics of Income, "General Description," op. cit., pp. 1-2.

The Source Book is published annually for returns with accounting periods ended between July 1 and June 30 of the following year. Therefore, the 1965 Source Book, for example, includes returns with accounting periods ended between July 1, 1965 and June 30, 1966, about one-half of which are for the calendar year ending December 31, 1965.

The financial information has increased over the years, but since 1948 relatively few changes have occurred. The number of asset size classes has also changed with data currently distributed by 14 size classes.

Of special concern to the researcher is the industry classification system used in the Statistics of Income. It has a number of shortcomings.[9]

The industrial classification used was revised for 1963 to conform with the Standard Enterprise Classification issued by the Bureau of the Budget. The structure of the Standard Enterprise Classification follows closely along the lines of the Standard Industrial Classification, which was designed as a means of classifying separate establishments rather than the companies of which establishments were part.

Year to year comparability of Source Book statistics is affected by consolidations and mergers, as well as by changes in the law, the tax forms, and the industrial classification systems used over the years.

For corporations, industry statistics are greatly affected by the returns of the larger companies. Since a return is classified by industry based on the activity accounting for the largest percentage of total receipts, this means that large corporations with diversified activities are included in only one industry even though many of their business operations are unrelated to the industry in which they are classified. It should therefore be noted in using the Source Book, especially for recent years, that statistics for an industry may be either understated by amounts reported by corporations whose principal activity lies elsewhere, or overstated by amounts reported by corporations classified in the industry but having substantial operations in other industries.

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[9] Ibid., pp. 2-3.

Unfortunately there is nothing that can be done about this reporting problem and the exact biases are unknown. Attributing part of the General Motors Corporation's profits from aircraft manufacture to the "automobile" industry may tend to either understate or overstate the profit rate from auto production. For the sake of present research we had to make the clearly inaccurate assumption that the profit rate shown by General Motors came from motor vehicle production alone while the reported profit rate in the aircraft industry came only from such primary suppliers as Boeing, Lockheed, and McDonald-Douglas.

The industry characteristics finally chosen included the following:

Market Power Factor ("Concentration") - Most previous research has used the four-firm concentration ratio to measure the extent of oligopoly in a given industry. The major problem with this variable is that it is only measured for manufacturing industries, leaving many sectors of economy without an index of concentration. This is particularly serious because the real variance in concentration may be found between sectors of the economy rather than within the manufacturing sector. We therefore turned to the Source Book to provide an alternative measure of "market power" which would yield an index for all sectors of the economy including retail trade, wholesale trade, and services.

The measure we chose to calculate makes use of the asset size classification in the Source Book. The "market power factor" (MPF) is the percentage of total sales in an industry (i.e. "business receipts") received by those firms in the top two asset categories. Unlike the traditional measure of concentration, the market power factor has a variable number of firms. This is apparently a minor shortcoming for the simple correlation between four-firm concentration ratios and the market power factor for all manufacturing industries in 1965 is .89. What is lost in terms of a defined number of firms is more than gained by the ability to measure "concentration" in the non-manufacturing sector.

The market power factor was calculated for 119 industries in the Source Book for each of three years: 1958, 1961, and 1965. (The 1953 data were not arranged in a manner which allowed calculation of this measure.) Several weights were attached to the three years and the several versions of the MPF were tested with macro data to see which explained average hourly earnings best. It turned out that equal weights on each of the years predicted wages as well as any other MPF index. This "unweighted" market power factor was then merged onto the SEO tape.

After-Tax Profit Rate - The profit measure also comes from the Source Book. The index of profits used is computed by dividing "net income" into "total assets." Thus the profit rate used is on an assets basis rather than on sales. This measure is also historical, using unweighted rates from 1953, 1958, 1961, and 1965. Again the use of the unweighted measure came from tests on macro industry data.

Capital/Labor Ratio - The actual measure used in "depreciable assets" divided by the number of production workers in an industry. This was a more difficult and somewhat more unreliable measure than the others for it relied on the merging of Source Book data on assets with employment figures from Employment and Earnings. Insofar as the SIC and SEC classifications do not link perfectly, the capital/labor ratios are imperfectly measured. The data refer only to the year 1965 because of the extremely time consuming process of matching other years for the two sources.

Government Demand - This was measured as the percentage of total final demand in each industry purchased by the federal, state, and local governments combined. It is derived from the 1958 Input-Output Matrix in a straight-forward manner. Its main drawback is that the Input-Output industry breakdown is quite different from the SIC and SEC classifications which poses some difficult linking problems.

Percent Minority Employment - The final industry variables used in the regression analysis were computed from the 1960 Census volume on "Industry Characteristics." The percentage of black male, black female, and white female employment in each census industry was calculated and added to the SEO file.

All of the industry data is reported in Table A.8.

TABLE A.8 THE INDUSTRY DATA

ID#	INDUSTRY	CONC.	PROF.	K/L	GOV. D.	%MIN
01016	AGRICULTURE	0.1021	0.0164	NA	0.0240	0.2067
01017	FORESTRY	0.2484	0.0240	NA	-0.1209	0.2155
01018	FISHERIES	0.0923	0.0059	NA	-0.1209	0.1165
02126	METAL MINING	0.6063	0.0344	39.2072	0.1091	0.0420
02136	COAL MINING	0.3224	0.0134	19.7765	0.0221	0.0560
02146	PETROLEUM & GAS EXTRACTION	0.4425	0.0414	23.5728	0.0	0.1149
02156	NONMETALIC MINING & QUARRYING	0.1488	0.0243	25.0831	-0.0010	0.1076
03000	CONSTRUCTION	0.0216	0.0245	11.0209	NA	0.1265
04206	LOGGING	0.2371	0.0406	NA	0.0009	0.2747
04207	SAWMILLS,PLANING MILLS	0.2371	0.0406	12.8503	0.0009	0.2288
04208	MISC WOOD PRODUCTS	0.1775	0.0360	6.1935	0.0009	0.3172
04209	FURNITURE & FIXTURES	0.0893	0.0419	3.9548	0.0495	0.2439
04216	GLASS & GLASS PRODUCTS	0.5577	0.0750	19.3688	0.0011	0.2855
04217	CEMENT,CONCRETE,GYPSUM,PLASTER	0.2525	0.0528	29.8127	0.0010	0.1583
04218	STRUCTURAL CLAY PRODUCTS	0.5234	0.0390	13.0643	0.0010	0.2626
04219	POTTERY & RELATED PRODUCTS	0.2387	0.0262	4.5705	0.0010	0.3622
04236	MISC MINERAL & STONE PRODUCTS	0.4633	0.0544	18.1580	0.0010	0.2279
04237	BLAST FURNACES,STEEL WORKS(1)	0.7180	0.0481	31.8519	0.0061	0.1639
04239	PRIMARY NONFERROUS INDUSTRIES	0.5341	0.0316	69.3857	0.0525	0.2006
04246	CUTLERY,HAND TOOLS,HARDWARE	0.1581	0.0754	6.0327	NA	0.3280
04247	FABRICATED STRUCTURAL METAL PRODUCTS	0.1044	0.0392	6.7429	0.0	0.1402
04248	MISC FABRICATED METAL PRODUCTS	0.2372	0.0512	11.1692	0.0257	0.2370
04256	FARM MACHINERY & EQUIP	0.7389	0.0348	17.2499	0.0097	0.1476
04257	OFFICE,COMPUTING,ACCTING MACHINERY	0.7267	0.0741	34.6225	0.0737	0.2534
04258	MISC MACHINERY	0.1816	0.0545	9.3115	0.0502	0.1520
04259	ELECTRICAL MACH,EQUIP,SUPPLIES	0.5204	0.0553	7.8971	0.0973	0.3735
04267	MOTOR VEHICALS,MOT VEH EQUIP	0.8786	0.0770	23.4105	0.0332	0.2053
04263	AIRCRAFT & PARTS	0.8406	0.0426	11.4435	0.5137	0.1931
04269	SHIP & BOAT BUILDING & REPAIRING	0.3928	0.0149	3.8691	0.1865	0.1546
04276	RAILROAD & MISC TRANSPORTATION EQUIP	0.4538	0.0289	14.4807	0.1865	0.1627
04286	PROFESSIONAL EQUIP & SUPPLIES	0.2547	0.0557	9.3756	0.0972	0.3210
04287	PHOTOGRAPHIC EQUIP & SUPPLIES	0.6699	0.0387	33.7084	0.0972	0.2891
04283	WATCHES & CLOCKS(2)	0.6395	0.0339	4.0852	NA	0.5313
05306	MEAT PRODUCTS	0.3402	0.0235	8.8045	0.0072	0.3639
05307	DAIRY PRODUCTS	0.4055	0.0481	21.7709	0.0072	0.1635
05308	CANNING & PRESERVING-FRUIT & VEG	0.2748	0.0427	9.2858	0.0072	0.4929
05309	GRAIN-MILL PRODUCTS	0.3866	0.0525	27.9480	0.0072	0.2288
05316	BAKERY PRODUCTS	0.2506	0.0538	11.0182	0.0072	0.3278
05317	CONFECTIONARY & RELATED PRODUCTS	0.2460	0.0765	5.7786	0.0072	0.5652
05318	BEVERAGE INDUSTRIES	0.3492	0.0472	39.6818	0.0072	0.1866

TABLE A.8 (Continued)

ID#	INDUSTRY	CONC.	PROF.	K/L	GOV. D.	%MIN
05319	MISC FOOD PREPARATIONS	0.3525	0.0467	25.0241	0.0072	0.3326
05329	TOBACCO MANUFACTURES	0.8967	0.0738	12.2338	0.0	0.6173
05346	KNITTING MILLS	0.1323	0.0382	4.0431	0.0024	0.6976
05347	DYEING & FINISHING TEXTILES(3)	0.1744	0.0234	3.6054	0.0024	0.2761
05348	FLOOR COVERING(EXC HARD SURFACE)	0.3168	0.0241	10.5136	0.0024	0.3845
05349	YARN,THREAD & FABRIC MILLS	0.3871	0.0345	33.4269	0.0062	0.4470
05356	MISC TEXTILE MILL PRODUCTS	0.3547	0.0301	2.4748	0.0458	0.3890
05366	APPAREL & ACCESSORIES	0.0449	0.0283	1.1906	0.0091	0.7753
05367	MISC FABRICATED TEXTILE PRODUCTS	0.1043	0.0247	2.2997	0.0458	0.6072
05386	PULP,PAPER & PAPERBOARD MILLS	0.5858	0.0504	17.4776	0.0089	0.1839
05387	PAPERBOARD CONTAINERS & BOXES	0.1559	0.0556	8.1469	0.0010	0.3359
05389	MISC PAPER & PULP PRODUCTS	0.2147	0.0638	12.1658	0.0089	0.3878
05396	NEWSPAPER PUBLISHING & PRINTING	0.2117	0.0666	14.8525	0.0213	0.2050
05398	PRINTING,PUBLISHING,ETC(4)	0.0929	0.0478	9.3934	0.0213	0.3629
05406	SYNTHETIC FIBERS	0.7331	0.0881	52.6890	0.0011	0.2633
05407	DRUGS & MEDICINES	0.6239	0.0993	32.4553	0.0478	0.3842
05408	PAINTS,VARNISHES & RELATED PRODUCTS	0.3819	0.0624	25.3242	0.0012	0.2364
05409	MISC CHEMICALS & ALLIED PRODUCTS	0.5747	0.0572	50.7991	0.0826	0.2287
05416	PETROLEUM REFINING	0.9347	0.0320	510.8074	0.0641	0.1497
05419	MISC PETROLEUM & COALPRODUCTS	0.3071	0.0422	26.8645	0.0641	0.2750
05426	RUBBER PRODUCTS	0.6173	0.0522	17.1447	0.0282	0.3063
05429	MISC PLASTIC PRODUCTS	0.0960	0.0407	5.3437	0.0282	0.3937
05436	LEATHER-TANNED,FINISHED,CURRYED	0.0873	0.0281	9.4909	0.0	0.2174
05437	FOOTWEAR,EXCEPT RUBBER	0.2468	0.0375	2.1882	0.0080	0.5543
05438	LEATHER PRODUCTS,EXC FOOTWEAR	0.0370	0.0317	3.5414	0.0080	0.5577
06506	RR & RAILWAY EXPRESS SERVICE	0.9257	0.0095	NA	NA	0.1370
06507	STREET RAILWAYS & BUS LINES	0.1476	0.0140	22.7297	NA	0.2139
06508	TAXICAB SERVICE	0.2833	0.0439	NA	NA	0.2163
06509	TRUCKING SERVICE	0.0275	0.0384	8.1359	NA	0.1246
06516	WAREHOUSING & STORAGE	0.0275	0.0384	91.1336	NA	0.2969
06517	WATER TRANSPORTATION	0.2178	0.0160	NA	NA	0.1980
06518	AIR TRANSPORTATION	0.7105	0.0191	NA	NA	0.2556
06519	PETROLEUM & GASOLINE PIPELINE	0.3750	0.0373	217.5037	NA	0.0991
06526	SERVICES INCIDENTAL TO TRANSPORT	0.1683	0.0216	NA	NA	0.3122
07536	RADIO BROADCASTING & T.V.	0.5348	0.0622	16.9890	0.0	0.2709
07538	TELEPHONE(WIRE & RADIO)	0.9590	0.0431	75.9472	0.0402	0.5737
07539	TELEGRAPH(WIRE & RADIO)	0.7836	0.0264	38.3041	0.0402	0.4325
08567	ELECTRIC LIGHT & POWER	0.9442	0.0280	162.8866	0.0415	0.1687
08568	GAS & STEAM SUPPLY SYSTEMS	0.8295	0.0229	169.9157	0.0415	0.1896
08569	ELECTRIC-GAS UTILITIES	0.9487	0.0268	200.7214	0.0415	0.1687

TABLE A.8 (Continued)

ID#	INDUSTRY	CONC.	PROF.	K/L	GOV. D.	%MIN
08576	WATER SUPPLY	0.1402	0.0194	71.5791	0.0415	0.2031
08578	SANITARY SERVICES	0.1402	0.0174	71.5791	0.0415	0.2980
09606	MOTOR VEHICLES & EQUIPMENT	0.3350	0.0433	2.6735	0.0090	0.1913
09607	DRUGS CHEMICALS & ALLIED PRODUCTS	0.2774	0.0565	2.7972	0.0090	0.3019
09608	DRY GOODS & APPAREL	0.0399	0.0233	2.0838	0.0090	0.3559
09609	FOOD & RELATED PRODUCTS	0.0146	0.0293	3.7193	0.0090	0.2879
09616	FARM PRODUCTS-RAW MATERIALS	0.2198	0.0707	NA	0.0090	0.2213
09617	ELECTRICAL GOODS & HARDWARE(5)	0.0893	0.0318	2.8999	0.0090	0.2440
09618	MACHINERY.EQUIPMENT & SUPPLIES	0.0590	0.0391	2.4919	NA	0.2110
10636	FOOD STORES(EXC DAIRY PRODUCTS)	0.3882	0.0496	3.4499	0.0090	0.3685
10637	DAIRY PRODUCTS & MILK RETAILING	0.3882	0.0496	NA	0.0090	0.3685
10638	GENERAL MERCHANDISE RETAILING	0.4285	0.0378	4.1517	0.0090	0.6820
10639	LIMITED PRICE VARIETY STORES	0.6344	0.0436	3.9344	0.0090	0.8130
10646	APPAREL & ACCESSORIES STORES	0.0668	0.0274	2.4320	0.0090	0.6919
10648	FURNITURE & FURNISHINGS STORES	0.0632	0.0126	3.5125	0.0090	0.3019
10649	HOUSEHOLD APPLIANCES,T.V. & RADIO	0.0632	0.0126	NA	0.0090	0.2717
10656	MOTOR VEHICLE & ACCESSORIES	0.0198	0.0133	2.8805	0.0090	0.1778
10657	GASOLINE SERVICE STATIONS	0.0395	0.0328	NA	0.0090	0.1096
10658	DRUG STORES	0.1505	0.0482	1.9740	0.0090	0.5399
10659	EATING & DRINKING PLACES	0.0573	0.0194	1.6875	0.0090	0.6358
10666	HARDWARE & FARM EQUIP STORES	0.0375	0.0130	0.8246	0.0090	0.2182
10676	LUMBER & BUILDING MATERIALS	0.0427	0.0254	2.5258	0.0090	0.2043
10678	LIQUOR STORES	0.1220	0.0260	NA	0.0090	0.2622
10686	JEWELRY STORES	0.0518	0.0184	NA	0.0090	0.4470
11706	BANKING & CREDIT AGENCIES	0.5180	0.0046	1.0236	0.0071	0.5844
11716	SECUR & COMMOD BROKERAGE CO (6)	0.0649	0.0136	1.5902	NA	0.3189
11726	INSURANCE	0.7592	0.0115	NA	0.0071	0.4651
11736	REAL ESTATE (7)	0.0332	0.0127	NA	0.0061	0.3957
12806	ADVERTISING	0.1898	0.0531	NA	0.0462	0.3954
12807	MISC BUSINESS SERVICES	0.0560	0.0377	NA	0.0462	0.4105
12808	AUTO REPAIR SERVICES & GARAGES	0.0865	0.0232	NA	0.0262	0.1606
12809	MISC REPAIR SERVICES	0.0620	0.0398	NA	0.0271	0.1243
13826	HOTEL & LODGING PLACES	0.1307	0.0031	11.4702	0.0271	0.6004
13828	LAUNDERING,CLEANING & DYEING	0.0747	0.0338	3.0820	0.0271	0.6433
13836	SHOE REPAIR SHOPS	0.0620	0.0398	NA	0.0271	0.2763
13838	BARBER & BEAUTY SHOPS	0.0355	0.0505	NA	0.0271	0.6110
14846	THEATERS & MOTION PICTURES	0.1062	0.0132	NA	0.0	0.3846
14848	BOWLING ALLEYS,POOL & BILLIARDS	0.0473	0.0169	NA	0.0	0.3036
14849	MISC ENTERTAINMENT & RECREATION	0.0473	0.0169	NA	-0.0050	0.4045

APPENDIX B

MEANS, STANDARD DEVIATIONS, AND CORRELATION MATRICES

Occupation Stratum 1-3 White Males

VARIABLE		MEAN	STANDARD DEVIATION
SCHCOL	1	9.050724638	2.836988389
WAGE	2	2.707318841	0.8761841121
UN MEM	3	0.5797101449	0.4954036061
MIG<50	4	0.4710144928	0.5009775697
S.AT16	5	0.2536231884	0.4366694486
EXP	6	29.63768116	12.00604594
TRAIN	7	0.9420289855D-01	0.2931749474
PHY DM	8	3.297101449	0.6771496755
NEG WT	9	1.311594203	0.7622548632
GED	10	1.952173913	0.1534124688
SVP	11	2.292028986	0.5531675997
%BMOCC	12	0.1537898551	0.8134619654D-01
%WFOCC	13	0.1436449275	0.1942395166
%BFOCC	14	0.3139130435D-01	0.6059900926D-01
DA/PW	15	24.52708360	49.00375487
NYL/PW	16	3.032517139	3.687716972
AVEMPF	17	0.3629292271	0.2805831844
FDSL	18	0.4064332987D-01	0.6818532197D-01
FDSLEX	19	0.6847513646D-01	0.8142093352D-01
ATPFAS	20	0.4167463768D-01	0.1734286728D-01
MININD	21	0.3012124489	0.1632553405
EDS16	22	1.956521739	3.756978063
UNXMPF	23	0.2481270531	0.3073745964
%PMOCC	24	0.1750362319	0.2360684798
MINOCC	25	0.3288260870	0.2045273673

Occupation Stratum 1-3 White Males

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CORRELATION MATRIX

VARIABLE       1              2              3              4              5              6              7              8
NUMBER

    1     1.00000        0.248569       0.568278D-01  -0.109377      -0.275604      -0.476702       0.310148      -0.102892
    2                    1.00000        0.282418      -0.141940      -0.350388      -0.231745       0.189954       0.688860D-02
    3                                   1.00000       -0.788542D-01  -0.212231       0.611828D-02  -0.772058D-01   0.703220D-01
    4                                                  1.00000       -0.495659D-01   0.100180      -0.155215       0.100879
    5                                                                 1.00000       -0.462076D-02  -0.169397D-01   0.148471D-01
    6                                                                                1.00000       -0.355209       0.321918D-01
    7                                                                                               1.00000       -0.105241
    8                                                                                                              1.00000
VARIABLE       9             10             11             12             13             14             15             16
NUMBER

    1    -0.951219D-01   0.760532D-01   0.863067D-01  -0.609657D-01   0.607128D-01  -0.406634D-01  -0.165067      -0.409643D-01
    2    -0.126938      -0.398418D-01   0.890661D-01  -0.955001D-01  -0.193301      -0.272872       0.180968D-01   0.137444
    3     0.207302D-01  -0.263071D-01  -0.203049D-01  -0.851638D-01   0.367445D-01  -0.116538       0.499344D-01   0.262830
    4     0.524954D-01  -0.371634D-01  -0.574693D-01   0.103286      -0.724544D-01  -0.479509D-01  -0.280949D-01  -0.390352D-01
    5     0.239952D-01   0.625334D-01   0.446924D-01   0.473355D-01  -0.356771D-01  -0.448784D-01  -0.397328D-01  -0.130759
    6    -0.122991D-01  -0.908033D-02  -0.836371D-01   0.475820D-01  -0.122128       0.455537D-01   0.825141D-01   0.878570D-01
    7    -0.132308       0.133360       0.171196      -0.677227D-01   0.248174D-01  -0.106858      -0.598157D-01   0.277047D-02
    8     0.696109      -0.740524      -0.728280       0.824973      -0.558752      -0.478152       0.192873       0.109881
    9     1.00000       -0.701810      -0.546288       0.683003      -0.167309       0.107956       0.512775D-01  -0.689748D-01
   10                    1.00000        0.737764      -0.675669       0.291041       0.158508      -0.187357      -0.525144D-01
   11                                   1.00000       -0.713320       0.139367       0.104047      -0.231765      -0.949402D-01
   12                                                  1.00000       -0.570883      -0.250883       0.180390       0.195577D-01
   13                                                                 1.00000        0.608590      -0.157098      -0.100514
   14                                                                                1.00000       -0.149111      -0.232038
   15                                                                                               1.00000        0.[illegible]66573
   16                                                                                                              1.00000
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Occupation Stratum 1-3 White Males (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.141655	-0.523377D-02	0.428688D-01	0.149627	-0.650629D-01	0.125354D-01	0.789773D-01	0.395168D-01
2	0.275904	0.878092D-01	0.127912	0.263330	-0.381537	-0.280848	0.319694	-0.229096
3	0.273440	0.101074	0.115482	0.323286	-0.159091	-0.162839	0.689850	0.318402D-03
4	-0.103405D-01	-0.269542D-01	-0.307195D-01	-0.962367D-01	-0.266435D-01	-0.859933D-01	-0.729633D-01	-0.719253D-01
5	-0.152285	0.190044	0.207108	-0.128781	0.193800D-01	0.896623	-0.226826	-0.408758D-01
6	-0.350986D-01	-0.379336D-01	-0.112249	-0.144909D-01	0.624785D-01	-0.146316	0.304100D-01	-0.887945D-01
7	0.889489D-01	-0.785589D-01	-0.484458D-01	0.326306D-01	-0.942304D-01	0.700152D-01	-0.169548D-01	-0.701047D-02
8	0.145305	-0.109526	-0.107072	0.588231D-01	-0.404059	-0.551379D-01	0.787431D-01	-0.582489
9	-0.652523D-01	-0.182528	-0.206977	-0.102871	-0.415669D-01	-0.207231D-01	-0.260383D-01	-0.109951
10	-0.471109D-01	0.204042	0.229803	0.322702D-01	0.198341	0.133140	-0.116566D-01	0.280161
11	-0.235087D-01	0.263119	0.275054	0.388052D-01	0.827132D-01	0.858819D-01	0.101236D-01	0.141381
12	-0.335420D-01	-0.188988	-0.241124	-0.163714	-0.184729	0.983390D-02	-0.448913D-01	-0.534130
13	-0.124535	-0.958165D-01	-0.531417D-01	-0.378558D-01	0.446750	0.344369D-01	-0.628895D-01	0.979036
14	-0.249226	-0.108167	-0.160696	-0.281522	0.611370	-0.976741D-02	-0.196532	0.757455
15	0.297717	0.890820D-02	-0.502280D-02	-0.104221	-0.173451	-0.667561D-01	0.277756	-0.167538
16	0.627292	0.994742D-01	0.146574	0.417685	-0.305893	-0.128465	0.605029	-0.142350
17	1.00000	0.142604	0.219425	0.487101	-0.370070	-0.110573	0.762784	-0.166445
18		1.00000	0.947289	-0.966849D-02	-0.230682	0.180700	0.162758	-0.106605
19			1.00000	0.116404	-0.282053	0.223627	0.201473	-0.849765D-01
20				1.00000	-0.375978	-0.102924	0.446164	-0.103415
21					1.00000	0.584609D-01	-0.320200	0.524530
22						1.00000	-0.183742	0.258030D-01
23							1.00000	-0.102209
24								1.00000

VARIABLE NUMBER	25
1	0.213631D-01
2	-0.302409
3	-0.335045D-01
4	-0.419373D-01
5	-0.283528D-01
6	-0.835632D-01
7	-0.350268D-01
8	-0.344203
9	0.144742
10	0.546339D-01
11	-0.120523
12	-0.218773
13	0.902962
14	0.774483
15	-0.121629
16	-0.156524
17	-0.205454
18	-0.198211
19	-0.193983
20	-0.184477
21	0.531948
22	0.336934D-01
23	-0.135826
24	0.941776
25	1.00000

Occupation Stratum 1-3 Black Males

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  VARIABLE                          MEAN                  STANDARD DEVIATION

SCHOOL      1                7.632411067              3.405652531
WAGE        2                2.169407115             0.8349864818
UNION       3               0.4743083004             0.5003292723
MIG<50      4               0.4584980237             0.4992622702
S. 16       5               0.7984189723             0.4019761088
EXP         6                33.10276680              12.64649523
TRAIN       7               0.9486166008D-01         0.2936045834
PHY DM      8                3.470355731             0.6577609567
NEG WT      9                1.383399209             0.8493935201
SVP        10                2.088932806             0.4576033661
%BNOCC     11               0.2539683794             0.1793019063
%WFOCC     12               0.1003873518             0.1630923884
%BFOCC     13               0.3325691700D-01         0.6452735056D-01
DA/PW      14                26.59372127              33.26334179
AVEMPF     15               0.3599994730             0.2770429297
FDSL       16               0.3205021528D-01         0.7341905883D-01
ATPFAS     17               0.3856719368D-01         0.1910244912D-01
%MININ     18               0.3175426489             0.1715143466
EDS16      19                5.806324111              4.232109816
UNXMPF     20               0.2322388669             0.3108318211
%FMOCC     21               0.1336442688             0.2155543424
%MINOC     22               0.3876126482             0.2119432580
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Occupation Stratum 1-3 Black Males

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CORRELATION MATRIX

VARIABLE      1              2              3              4              5              6              7              8
 NUMBER

    1     1.00000        0.176282       0.121358      -0.140870      -0.210870       0.654943       0.265190      -0.157886
    2                    1.00000        0.496698      -0.181349      -0.338726      -0.549959D-02   0.180873       0.124134
    3                                   1.00000       -0.143288      -0.252756      -0.359559D-01   0.436700D-01   0.103184
    4                                                  1.00000       -0.111057      -0.992522D-01  -0.813207D-01   0.114056
    5                                                                 1.00000        0.132110      -0.544879D-02   0.448469D-01
    6                                                                                1.00000       -0.227068       0.871902D-01
    7                                                                                               1.00000       -0.881207D-01
    8                                                                                                              1.00000

VARIABLE      9              10             11             12             13             14             15             16
 NUMBER

    1    -0.251641D-01   0.122912      -0.162566       0.150168       0.169774      -0.155645       0.306391D-01   0.923564D-02
    2     0.759121D-01  -0.479548D-01  -0.212127      -0.810917D-01  -0.142056       0.155235       0.535418       0.139908
    3     0.466141D-01  -0.359113D-01  -0.107043      -0.279374D-01  -0.593463D-01  -0.116395       0.445357      -0.306021D-01
    4     0.891371D-01  -0.906017D-01   0.648383D-01  -0.869879D-01  -0.579917D-01  -0.577555D-01  -0.326890D-01  -0.451808D-01
    5     0.180535D-01  -0.617942D-01   0.260634D-01   0.606960D-01   0.407103D-01   0.211305D-02  -0.156224       0.258294D-01
    6     0.407530D-02  -0.543852D-01   0.396385D-01  -0.433873D-01  -0.757704D-01   0.172505       0.305836D-01   0.300545D-01
    7     0.127045D-01   0.669165D-01  -0.143465       0.123288       0.106997      -0.342464D-01   0.541979D-01  -0.536778D-02
    8     0.634806      -0.606233       0.456174D-01  -0.611906      -0.629087       0.374947       0.325216       0.593007D-01
    9     1.00000       -0.327993      -0.346672      -0.632371D-01   0.231018D-01   0.290238       0.157582       0.530023D-01
   10                    1.00000       -0.198680       0.309674       0.297851      -0.270263      -0.211116      -0.281278D-01
   11                                   1.00000       -0.456323      -0.302709      -0.109907      -0.102988      -0.998564D-01
   12                                                  1.00000        0.745956      -0.186105      -0.197400      -0.548183D-01
   13                                                                 1.00000       -0.224251      -0.289997      -0.482009D-01
   14                                                                                1.00000        0.356132      -0.255270D-01
   15                                                                                               1.00000        0.812348D-01
   16                                                                                                              1.00000

VARIABLE      17             18             19             20             21             22
 NUMBER

    1     0.105797       0.131958       0.504113       0.926032D-01   0.164443       0.297148D-01
    2     0.393596      -0.326944      -0.191598       0.561715      -0.103891      -0.285108
    3     0.407781      -0.205362      -0.119489       0.788142      -0.389036D-01  -0.132492
    4     0.614580D-01  -0.116212      -0.194444      -0.117332      -0.831768D-01  -0.297414D-01
    5    -0.545070D-01   0.391922D-01   0.690739      -0.208562       0.581106D-01   0.811501D-01
    6    -0.509158D-01  -0.731768D-01  -0.334903       0.119991D-01  -0.555099D-01  -0.237679D-01
    7     0.129470      -0.194046D-01   0.168137       0.553644D-01   0.125312       0.607706D-02
    8     0.212897      -0.624305      -0.612299D-01   0.229329      -0.654326      -0.626883
    9     0.109611      -0.361913       0.152191D-01   0.134127      -0.409307D-01  -0.334909
   10    -0.105075       0.240110       0.165107D-01  -0.114688       0.323468       0.160898
   11    -0.136486       0.175399      -0.899027D-01  -0.120788      -0.435880       0.402684
   12    -0.978941D-01   0.476112       0.160317      -0.136263       0.979924       0.610576
   13    -0.189396       0.602663       0.158892      -0.177699       0.863760       0.622387
   14    -0.106645      -0.327499      -0.856542D-01   0.545796D-01  -0.207941      -0.304464
   15     0.595585      -0.411127      -0.119964       0.776040      -0.236169      -0.327319
   16    -0.124086      -0.157605       0.272999D-01   0.892072D-03  -0.559057D-01  -0.141336
   17     1.00000       -0.309779       0.205321D-01   0.528674      -0.130765      -0.248459
   18                    1.00000        0.128388      -0.354616       0.540646       0.698243
   19                                   1.00000       -0.117213       0.168864       0.956841D-01
   20                                                  1.00000       -0.156294      -0.261143
   21                                                                 1.00000        0.648288
   22                                                                                1.00000
```

Occupation Stratum 1-3 White Females

```
  VARIABLE                       MEAN              STANDARD DEVIATION

SCHOOL      1              9.030769231             2.555442909
WAGE        2              1.739846154            0.4822132966
UN MEM      3             0.3230769231            0.4712911888
MIG<50      4             0.5076923077            0.5038314737
S.AI16      5             0.4153846154            0.4966232127
EXP         6              33.23076923             10.65769855
TRAIN       7          0.3076923077D-01           0.1740358053
PHY DM      8              2.723076923            0.6497040746
NEG WT      9              1.200000000            0.6661456297
GED        10              1.981538462        0.7683648973D-01
SVP        11              2.315384615            0.4528488880
%BMOCC     12         0.8510769231D-01        0.6212440218D-01
%WFOCC     13             0.4384000000            0.2216394031
%BFOCC     14             0.1057692308            0.1279149827
DA/PW      15              11.07468642             12.52801458
NYL/PW     16              1.950009438             2.700780456
AVEMPF     17             0.2597128205            0.1896011473
EDSL       18         0.2521637233D-01        0.3392743295D-01
EDSLEX     19         0.4857763837D-01        0.5459279022D-01
ATREAS     20         0.4066923077D-01        0.1636689612D-01
MININD     21             0.4629771389            0.1765681434
EDS16      22              3.353846154             4.431530383
UNXMPF     23         0.3493641026D-01            0.1827956103
%FMOCC     24             0.5441692308            0.2619615650
MINOCC     25             0.6292769231            0.2201675859
```

Occupation Stratum 1-3 White Females

```
CORRELATION MATRIX

VARIABLE       1              2              3              4              5              6              7              8
 NUMBER

    1     1.00000        0.451280       0.277039      -0.608657D-01  -0.318027      -0.569956       0.681040D-01   0.193433
    2                    1.00000        0.390739      -0.121867      -0.604077D-01  -0.250028       0.158314       0.381390
    3                                   1.00000        0.222718D-01  -0.248545      -0.105287       0.674072D-01   0.245723
    4                                                  1.00000       -0.106639       0.738655D-01  -0.274147D-02  -0.888569D-01
    5                                                                 1.00000        0.937856D-01  -0.150188      -0.253305D-01
    6                                                                                1.00000       -0.881279D-01  -0.157610
    7                                                                                               1.00000        0.765341D-01
    8                                                                                                              1.00000
VARIABLE       9              10             11             12             13             14             15             16
 NUMBER

    1    -0.220291D-01  -0.140300      -0.328204D-01   0.760583D-01  -0.171614      -0.219765      -0.155979D-01  -0.570046D-02
    2    -0.230276      -0.129121      -0.237564       0.104658D-01  -0.117707      -0.523046       0.294228       0.249074
    3    -0.995386D-02  -0.177904      -0.235965       0.815111D-01  -0.331178D-01  -0.220865       0.149524       0.948367D-01
    4    -0.744879D-01   0.372569D-02  -0.754579D-01  -0.133562       0.134298       0.153374       0.248288       0.203656
    5    -0.188923D-01  -0.415773D-01  -0.983364D-01   0.486653D-01   0.121683      -0.150719       0.880943D-01  -0.225846D-01
    6    -0.200276       0.358126D-01   0.465197D-01  -0.332656D-01   0.767966D-01   0.143123      -0.272219D-01  -0.108715
    7     0.898655D-01   0.431431D-01   0.732025D-01  -0.320161D-02   0.401833D-01   0.102582D-02   0.217408       0.144243
    8     0.166071      -0.542203      -0.569470       0.663882      -0.529709      -0.523451       0.987232D-01   0.186315
    9     1.00000       -0.354113      -0.258981D-01   0.540518      -0.300892       0.284041      -0.931051D-01  -0.970219D-01
   10                    1.00000        0.421421      -0.672165       0.407443       0.190967      -0.185719      -0.116259
   11                                   1.00000       -0.368233       0.109440       0.337528D-01  -0.488794D-01  -0.593992D-01
   12                                                  1.00000       -0.785351      -0.149887      -0.124749      -0.771980D-01
   13                                                                 1.00000        0.553348D-01   0.218605       0.136653
   14                                                                                1.00000       -0.284549      -0.369998
   15                                                                                               1.00000        0.823977
   16                                                                                                              1.00000
```

Occupation Stratum 1-3 White Females (cont.)

```
VARIABLE      17            18            19            20            21            22            23            24
NUMBER

   1     0.171792      0.191157      0.239208      0.407739     -0.231611      0.266185D-01  0.328252     -0.252509
   2     0.329632      0.644460D-01  0.133307      0.484118     -0.556114      0.120013      0.519353     -0.354991
   3     0.125356     -0.346781D-01 -0.346947D-01  0.235677     -0.272806     -0.137886      0.757618     -0.135868
   4     0.439428D-01 -0.188157     -0.223072     -0.123324      0.219958D-01 -0.172692      0.831198D-01  0.188518
   5     0.161978     -0.162306     -0.112125     -0.337738D-01 -0.383978D-01  0.904828     -0.640768D-01  0.293570D-01
   6    -0.279284D-01 -0.170964     -0.246495     -0.416369      0.110637     -0.768540D-01 -0.156543      0.134862
   7     0.533065D-01 -0.126354     -0.330782D-01 -0.259928D-01 -0.311347D-01 -0.135894      0.189009      0.344991D-01
   8     0.367977      0.159976D-01  0.218485      0.416494     -0.366346      0.454189D-01  0.191578     -0.703774
   9    -0.289534     -0.253170D-01 -0.730530D-01 -0.282326D-01  0.307002     -0.190546D-01 -0.150410     -0.115882
  10    -0.397444      0.859753D-01 -0.693549D-02 -0.196272      0.154775     -0.118179     -0.197066      0.437976
  11    -0.342606      0.237369      0.572393D-01 -0.237671      0.223217     -0.160032     -0.272358      0.109076
  12    -0.169463D-02 -0.433446D-01  0.862005D-03  0.127114      0.331878D-01  0.587143D-01  0.151355D-01 -0.737656
  13     0.195229     -0.343559     -0.261581     -0.127093      0.445980D-01  0.108633      0.217111D-01  0.873096
  14    -0.435377     -0.482292D-01 -0.250746     -0.553086      0.485321     -0.203332     -0.243927      0.535114
  15     0.592355     -0.276182     -0.883348D-01  0.305163     -0.438635      0.908542D-01  0.409904      0.460118D-01
  16     0.595518     -0.104183      0.129337      0.562852     -0.409843     -0.165634D-01  0.262693     -0.650495D-01
  17     1.00000      -0.104613      0.183446      0.535479     -0.507536      0.249562      0.505696     -0.123562
  18                   1.00000       0.897257      0.178314     -0.139882     -0.122891     -0.677186D-01 -0.314227
  19                                 1.00000       0.397594     -0.266499     -0.334775D-01 -0.137281D-01 -0.343756
  20                                               1.00000      -0.623418      0.124842      0.358497     -0.377601
  21                                                             1.00000      -0.154003     -0.427783      0.274714
  22                                                                           1.00000       0.745002D-01 -0.737435D-02
  23                                                                                         1.00000      -0.100739
  24                                                                                                       1.00000

VARIABLE      25
NUMBER

   1    -0.278991
   2    -0.416986
   3    -0.118660
   4     0.136617
   5     0.486616D-01
   6     0.151076
   7     0.491446D-01
   8    -0.650063
   9     0.146381D-01
  10     0.345561
  11     0.258774D-01
  12    -0.595515
  13     0.917232
  14     0.594400
  15     0.195459D-01
  16    -0.991806D-01
  17    -0.147495
  18    -0.386107
  19    -0.408767
  20    -0.413413
  21     0.336227
  22     0.779314D-02
  23    -0.115552
  24     0.981685
  25     1.00000
```

Occupation Stratum 1-3 Black Females

```
  VARIABLE                         MEAN                STANDARD DEVIATION

 SCHOOL     1              8.481751[illegible]25             3.014919250
 WAGE       2              1.358467153            0.5010061795
 UNION      3             0.2919708029            0.4563374645
 MIG<50     4             0.4160583942            0.4947122718
 S. 16      5             0.7445255474            0.4377280428
 EXP        6              31.27007299             11.47343713
 TRAIN      7             0.7299270073D-01        0.2610791095
 PHY DM     8              2.343065693            0.5063995778
 NEG WT     9              1.386861314            0.7096827707
 SVP       10              2.411573832            0.3976152614
 %PMOCC    11             0.7124087591D-01        0.4600823544D-01
 %MFOCC    12             0.4315255474            0.9846640815D-01
 %PFOCC    13             0.2868248175            0.1963778957
 DA/PW     14              7.171518952             14.38949504
 AVEMPF    15             0.1504223844            0.1584202399
 EDSL      16             0.2140847295D-01        0.1147949070D-01
 ATREAS    17             0.2444160584D-01        0.1742214464D-01
 %MININ    18             0.5964407771            0.1071694530
 EDS16     19              6.204379562             4.462488557
 UNXMPF    20             0.4122749392D-01        0.1063381657
 %FMOCC    21             0.7183503650            0.1871126820
 %MINOC    22             0.7895912409            0.1492582915
```

Occupation Stratum 1-3 Black Females

```
CORRELATION MATRIX

VARIABLE        1               2               3               4               5               6               7               8
 NUMBER

    1      1.00000         0.356580       -0.281654D-01   -0.317777       -0.843469D-01   -0.549443        0.235240        0.117308
    2                      1.00000         0.271493       -0.278646       -0.251251       -0.253636        0.158824        0.177717
    3                                      1.00000        -0.534914D-01   -0.286423        0.157248D-01    0.128389       -0.866303D-01
    4                                                      1.00000        -0.116736        0.118669       -0.660713D-01    0.159821
    5                                                                      1.00000         0.724022D-01   -0.286480D-01   -0.992720D-01
    6                                                                                      1.00000        -0.210368       -0.426402D-01
    7                                                                                                      1.00000         0.872798D-01
    8                                                                                                                      1.00000

VARIABLE        9               10              11              12              13              14              15              16
 NUMBER

    1     -0.571254D-01    0.417749D-01    0.738255D-01    0.172445       -0.263789       -0.358098D-01    0.374570D-01   -0.307910D-02
    2     -0.126330       -0.463320D-01    0.519547D-01    0.151200       -0.277409        0.620019D-01    0.961124D-01    0.313239D-01
    3     -0.160731       -0.873216D-01   -0.113673        0.116999       -0.705576D-02   -0.341951D-01   -0.375035D-01    0.156472D-01
    4     -0.107013D-02   -0.123601D-01    0.398227D-01   -0.281749D-01   -0.239936D-01    0.115052        0.177317       -0.316880D-01
    5     -0.100845D-01   -0.325729D-01   -0.956431D-01   -0.215050D-02    0.156696        0.611000D-01   -0.712002D-01   -0.509452D-01
    6      0.374500D-01    0.690034D-01    0.100000       -0.124465        0.929866D-01    0.177848        0.814926D-02    0.288939D-01
    7     -0.344709D-01   -0.436880D-01   -0.198388D-01    0.188130       -0.148184       -0.214013D-01    0.145039       -0.139114
    8      0.371963D-01    0.133330        0.493172       -0.137243       -0.595490        0.105344        0.274466       -0.272956
    9      1.00000         0.339254        0.514401       -0.153294       -0.727937D-01   -0.297558       -0.348193        0.170832
   10                      1.00000         0.473153        0.285157       -0.527998       -0.268350       -0.260920       -0.304105
   11                                      1.00000        -0.272425       -0.685200       -0.862050D-01   -0.821918D-01   -0.408737D-01
   12                                                      1.00000        -0.342582       -0.552527D-01   -0.312434D-01   -0.255699
   13                                                                      1.00000         0.891400D-01   -0.726013D-01    0.266827
   14                                                                                      1.00000         0.509272        0.168116
   15                                                                                                      1.00000        -0.198695
   16                                                                                                                      1.00000

VARIABLE        17              18              19              20              21              22
 NUMBER

    1      0.230774       -0.470409D-01    0.422195        0.568170D-01   -0.186103       -0.211470
    2      0.334538       -0.300027       -0.453562D-01    0.194782       -0.211578       -0.249223
    3      0.142236D-02    0.595247D-01   -0.274499        0.605961        0.541642D-01    0.328557D-01
    4      0.115413D-01   -0.170554       -0.275219        0.873712D-01   -0.404295D-01   -0.384079D-01
    5     -0.258956        0.100337        0.917421       -0.176424        0.163324        0.178346
    6     -0.112031        0.461040D-01   -0.234605       -0.354794D-01    0.320927D-01    0.710565D-01
    7      0.172244       -0.111435D-01    0.100704        0.302421       -0.565197D-01   -0.769693D-01
    8      0.241313       -0.390067       -0.733010D-01    0.152332       -0.697193       -0.720153
    9      0.163122        0.296420       -0.414021D-01   -0.944510D-01   -0.157058       -0.383408D-01
   10      0.778054D-01    0.275034       -0.199514       -0.145343       -0.404078       -0.382289
   11      0.552720       -0.917147D-01   -0.627902D-01   -0.485770D-01   -0.862490       -0.772986
   12      0.124567        0.171126        0.950364D-01    0.860143D-01    0.146696        0.124999
   13     -0.536219        0.155073        0.337240D-01   -0.811422D-01    0.869236        0.878479
   14     -0.320165D-01   -0.444178        0.470456D-01    0.252316D-01    0.644777D-01    0.542580D-01
   15      0.310549       -0.316717       -0.534137D-01    0.402043       -0.926378D-01   -0.141468
   16     -0.500012D-01   -0.140818       -0.244541D-01   -0.107282        0.145480        0.169777
   17      1.00000        -0.264541       -0.123417        0.211506       -0.602181       -0.584510
   18                      1.00000         0.742277D-01    0.348358D-01    0.283749        0.289834
   19                                      1.00000        -0.104063        0.101165        0.105464
   20                                                      1.00000        -0.399158D-01   -0.650140D-01
   21                                                                      1.00000         0.987758
   22                                                                                      1.00000
```

Occupation Stratum 1-3 Cross Race-Sex

```
  VARIABLE                        MEAN               STANDARD DEVIATION

 SCHOOL      1              8.805054152            2.986365711
 WAGE        2              2.256895307           0.8910377641
 UNION       3             0.5018050542           0.5009017140
 MIG<50      4             0.4801444043           0.5005098540
 S 16        5             0.4115523466           0.4930055431
 EXP         6              30.91335740            11.69694630
 RACE        7             0.2671480144           0.4432711365
 SEX         8             0.3285198556           0.4705250426
 TRAIN       9             0.7942238257D-01       0.2708862774
 PHY DM     10              3.158844765           0.7542412214
 NEG WT     11              1.357400722           0.7313312472
 SVP        12              2.251985560           0.5039388620
 %BMOCC     13             0.1444620939           0.9368198696D-01
 %WFOCC     14             0.2284296029           0.2387936004
 %BFOCC     15             0.6558122744D-01       0.1130958844
 DA/PW      16              19.81431531            37.11690734
 AVEMPF     17             0.3177830325           0.2611143641
 FDSL       18             0.3273654060D-01       0.5999988587D-01
 ATPFAS     19             0.3977617329D-01       0.1724683155D-01
 %MININ     20             0.3590887916           0.1878449060
 EDS16      21              3.122743682            4.294345252
 UNXMPF     22             0.2012518652           0.2839610008
 %FMOCC     23             0.2940108303           0.3066052511
 %MINOC     24             0.4384729242           0.2526728068
 RAXSEX     25             0.9386281588D-01       0.2921656195
```

Occupation Stratum 1-3 Cross Race-Sex

```
CORRELATION MATRIX

VARIABLE       1             2             3             4             5             6             7             8
 NUMBER

   1      1.00000       0.251772      0.123764     -0.777435D-01 -0.341516     -0.522938     -0.132948     -0.670221D-03
   2                    1.00000       0.392999     -0.912925D-01 -0.378463     -0.231370     -0.243278     -0.483150
   3                                  1.00000      -0.106955D-01 -0.223098     -0.389321D-01  0.141384D-01 -0.210059
   4                                                1.00000      -0.113598      0.399322D-01 -0.866655D-02  0.472101D-02
   5                                                              1.00000       0.834867D-01  0.357206      0.865663D-01
   6                                                                            1.00000       0.177574D-01  0.144754
   7                                                                                          1.00000       0.293498D-01
   8                                                                                                        1.00000

VARIABLE       9             10            11            12            13            14            15            16
 NUMBER

   1      0.278979     -0.505448D-01 -0.758147D-01  0.679095D-01 -0.112503      0.425573D-01 -0.504047D-01 -0.122450
   2      0.199320      0.265983     -0.935351D-01 -0.210865D-01  0.106647     -0.379572     -0.411184      0.132669
   3     -0.106039D-02  0.191043      0.229591D-01 -0.110896      0.241494D-01 -0.116945     -0.176126      0.652795D-01
   4     -0.684967D-01  0.755690D-01  0.343049D-01 -0.662805D-01  0.362824D-01 -0.142325D-01 -0.673554D-01 -0.207885D-01
   5     -0.109990      0.184323D-01  0.729191D-01 -0.820518D-01  0.101616      0.310233D-01  0.399470D-01 -0.403120D-01
   6     -0.320284     -0.656080D-01 -0.179680D-01 -0.328554D-01 -0.379875D-01  0.349568D-01  0.115627      0.537268D-01
   7      0.338778D-01  0.100194      0.184998     -0.156471      0.224303     -0.566716D-01  0.152206     -0.181208D-01
   8     -0.633179D-01 -0.484483     -0.792158D-01  0.143165     -0.451425      0.617295      0.472324     -0.195158
   9      1.00000      -0.265042D-01 -0.523580D-01  0.136857     -0.880351D-03  0.372753D-02 -0.615910D-01 -0.322282D-01
  10                    1.00000       0.507577     -0.632832      0.735298     -0.671355     -0.591319      0.245653
  11                                  1.00000      -0.386817      0.492518     -0.231153      0.779941D-01  0.659807D-01
  12                                                1.00000      -0.511932      0.216788      0.111965     -0.228690
  13                                                              1.00000      -0.693078     -0.374247      0.179973
  14                                                                            1.00000       0.447923     -0.208316
  15                                                                                          1.00000      -0.188547
  16                                                                                                        1.00000
```

Occupation Stratum 1-3 Cross Race-Sex (cont.)

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VARIABLE     17              18              19              20              21              22              23              24
 NUMBER

    1    0.137572       0.637115D-01  0.217391      -0.580819D-01   0.493361D-01   0.116748       0.145602D-01  -0.240440D-01
    2    0.399659       0.137833      0.316402      -0.509472      -0.289845       0.441773      -0.447294      -0.503227
    3    0.320646       0.884911D-01  0.335484      -0.234721      -0.146645       0.707455      -0.156047      -0.180401
    4    0.575148D-01  -0.375271D-01 -0.689659D-02  -0.714195D-01  -0.152261       0.130390D-01  -0.359687D-01  -0.301939D-01
    5   -0.142854       0.556871D-01 -0.155356       0.772113D-01   0.871096      -0.190081       0.388969D-01   0.848748D-01
    6   -0.777820D-01  -0.799349D-01 -0.117378       0.125203      -0.117072      -0.505585D-01   0.698839D-01   0.707163D-01
    7   -0.768688D-01  -0.820545D-01 -0.151674       0.537038D-01   0.277735       0.127151D-01   0.421740D-02   0.882813D-01
    8   -0.240260      -0.105043     -0.103418       0.521601       0.857659D-01  -0.271759       0.654993       0.627427
    9    0.108626      -0.724070D-01  0.350724D-01  -0.599859D-01  -0.208692D-01   0.834184D-01  -0.198156D-01  -0.243716D-01
   10    0.304624      -0.142527D-01  0.193480      -0.572653      -0.250583D-01   0.250554      -0.741145      -0.625719
   11   -0.290791D-01  -0.101208     -0.552797D-01  -0.190389D-01   0.425107D-01   0.317551D-01  -0.151260      -0.937612D-03
   12   -0.159227       0.180564     -0.774871D-01   0.228782      -0.530642D-01  -0.113561       0.210141       0.651895D-01
   13    0.711902D-01  -0.794485D-01 -0.242380D-01  -0.339414       0.233195D-01   0.930371D-01  -0.677837      -0.451756
   14   -0.200384      -0.143196     -0.914444D-01   0.535278       0.877066D-01  -0.202315       0.944054       0.888591
   15   -0.323755      -0.859316D-01 -0.378892       0.619209       0.529985D-01  -0.253203       0.717721       0.732160
   16    0.315218       0.115550D-01 -0.344935D-01  -0.255320      -0.703821D-01   0.281233      -0.231791      -0.214538
   17    1.00000        0.101143      0.526827      -0.448590      -0.898202D-01   0.770355      -0.275487      -0.307894
   18                   1.00000      -0.133086D-01  -0.203932       0.932895D-01   0.126100      -0.143222      -0.203250
   19                                 1.00000       -0.394771      -0.572748D-01   0.451085      -0.210980      -0.264999
   20                                                1.00000        0.840341D-01  -0.398300       0.645295       0.657190
   21                                                               1.00000       -0.130540       0.878579D-01   0.115257
   22                                                                              1.00000       -0.255045      -0.274970
   23                                                                                             1.00000        0.962130
   24                                                                                                            1.00000

VARIABLE     25
 NUMBER

    1   -0.620040D-01
    2   -0.301307
    3   -0.505772D-01
    4   -0.367630D-01
    5    0.133308
    6    0.734220D-01
    7    0.533067
    8    0.460135
    9    0.428050D-01
   10   -0.314533
   11    0.459123D-01
   12    0.129154
   13   -0.216303
   14    0.285360
   15    0.474231
   16   -0.124497
   17   -0.207667
   18   -0.681386D-01
   19   -0.208292
   20    0.394222
   21    0.947444D-01
   22   -0.135882
   23    0.397174
   24    0.401753
   25    1.00000
```

Occupation Stratum 5 White Males

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  VARIABLE                        MEAN                STANDARD DEVIATION

SCHOOL       1              9.671171171              2.730147298
WAGE         2              2.866148649             0.8895598554
UN MEM       3             0.5990990991             0.4906338086
MIG<50       4             0.5112612613             0.5004370408
S.AT16       5             0.2545045045             0.4360736756
EXP          6              29.78603604              12.09207279
TRAIN        7             0.1328828829             0.3398310226
PHY DM       8              2.110360360             0.3478159601
NEG WT       9             0.3153153153D-01         0.1749463546
GED         10              2.532882883             0.1128325025
SVP         11              2.929729730             0.1680291250
%BMOCC      12             0.7307432432D-01         0.4341615898D-01
%WFOCC      13             0.2799346847             0.1113156607
%BFOCC      14             0.2549549550D-01         0.6611944693D-02
DA/PW       15              30.70714391              73.18803550
NYL/PW      16              4.329228404              5.144872989
AVEMPF      17             0.4467765015             0.2752137339
FDSL        18             0.3552091090D-01         0.4074778927D-01
FDSLEX      19             0.7086173176D-01         0.5854151998D-01
ATPFAS      20             0.4989414414D-01         0.1619400892D-01
MININD      21             0.2845968977             0.1440114972
EDS16       22              2.317567568              4.251264310
UNXMPF      23             0.3005274024             0.3284232519
%FMOCC      24             0.3054301802             0.1134623060
MINOCC      25             0.3785045045             0.9497692474D-01
```

Occupation Stratum 5 White Males

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CORRELATION MATRIX

VARIABLE      1             2              3              4              5              6              7              8
 NUMBER

   1      1.00000       0.269834      0.415986D-02 -0.516059D-01 -0.121048      -0.494339       0.210216      -0.118591
   2                    1.00000       0.146030     -0.105196      -0.182692      -0.141436       0.115497      -0.102661
   3                                  1.00000       0.735968D-01 -0.133974       0.334502D-01 -0.453118D-01  0.482042D-01
   4                                                1.00000      -0.132118       0.617628D-01 -0.267292D-01 -0.136405D-01
   5                                                               1.00000       0.257616D-01  0.302250D-01 -0.516543D-01
   6                                                                             1.00000      -0.323761       0.866715D-01
   7                                                                                           1.00000        0.933384D-02
   8                                                                                                          1.00000

VARIABLE      9             10             11             12             13             14             15             16
 NUMBER

   1      0.879230D-01 -0.139222      -0.208438      -0.283226       0.177043      -0.151332       0.104531       0.153184
   2     -0.136035D-01 -0.109273      -0.985133D-01 -0.184969       0.175942      -0.502888D-01  0.199890       0.259316
   3     -0.898838D-01 -0.132373       0.682313D-01  0.267291D-01  0.220039D-02  0.111472       0.878744D-02  0.188521
   4     -0.556320D-01 -0.257511D-02  0.496954D-01 -0.101684D-01  0.550396D-02  0.221872D-01 -0.195410D-01 -0.368229D-01
   5     -0.462496D-01 -0.557766D-01  0.597626D-01  0.266600D-01 -0.709724D-02  0.869091D-01  0.765801D-01  0.913778D-01
   6      0.370981D-01  0.111386       0.413559D-01  0.185604      -0.191633      -0.352900D-01 -0.407798D-01 -0.109359
   7     -0.326670D-01 -0.259064D-01 -0.100433D-01 -0.121844       0.177399       0.286968D-01 -0.287569D-01 -0.357758D-01
   8      0.168776D-01  0.309956      -0.485415D-01  0.513083      -0.145562      -0.171066      -0.708286D-01 -0.333417D-01
   9      1.00000      -0.690254D-02 -0.369839      -0.728246D-01 -0.407911      -0.591173      -0.351418D-01 -0.426491D-01
  10                    1.00000       0.547047D-02  0.352932      -0.144075      -0.420531      -0.229890D-01 -0.926234D-01
  11                                  1.00000       0.173255      -0.137176       0.550344       0.315289D-01 -0.264752D-01
  12                                                1.00000      -0.604138       0.176666      -0.807777D-02 -0.302563D-01
  13                                                               1.00000       0.298393       0.602931D-02  0.510236D-01
  14                                                                             1.00000        0.411737D-01  0.456635D-01
  15                                                                                            1.00000        0.857544
  16                                                                                                           1.00000
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Occupation Stratum 5 White Males (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.134661	0.111759	0.172502	0.126544	-0.150175	0.854523D-01	0.631393D-01	0.164871
2	0.309546	0.197465	0.211901	0.211321	-0.253696	-0.740330D-01	0.226422	0.169683
3	0.243334	0.141441	0.125989	0.230514	-0.220110	-0.979142D-01	0.749392	0.280836D-01
4	-0.657658D-01	-0.434193D-01	-0.415294D-01	0.514272D-01	0.411810D-01	-0.141213	0.643869D-03	0.669277D-02
5	0.217756D-01	-0.281172D-01	-0.175518D-01	-0.218447D-01	0.727923D-01	0.934362	-0.264580D-01	-0.189839D-02
6	-0.966539D-01	-0.116445	-0.107615	-0.162520	0.612378D-01	-0.803516D-01	-0.195347D-01	-0.190040
7	0.431756D-02	0.377420D-01	-0.826887D-03	-0.279149D-01	-0.265751D-01	0.754120D-01	-0.379764D-01	0.175727
8	-0.454425D-01	0.783965D-01	0.837371D-01	0.231392D-01	-0.430796D-01	-0.771578D-01	0.418955D-01	-0.153758
9	-0.322713D-01	-0.259263D-01	-0.826790D-02	-0.616052D-01	0.342777D-01	-0.377752D-01	-0.948152D-01	-0.434643
10	-0.906081D-01	-0.115358	-0.172297	-0.272362	0.354617	-0.589365D-01	-0.120049	-0.160028
11	-0.139582	-0.377763D-01	-0.128176	-0.585810D-01	0.761203D-01	0.240423D-01	-0.190754D-01	-0.102475
12	-0.623479D-01	-0.131608	-0.159763	-0.897613D-01	0.372612D-01	-0.258482D-01	0.218842D-01	-0.582412
13	0.157684	0.100294	0.142488	0.112078	-0.213344D-01	0.285215D-01	0.382085D-01	0.998452
14	-0.162339D-01	-0.216967D-01	-0.517815D-01	0.736710D-01	-0.682698D-01	0.526121D-01	0.732739D-01	0.350728
15	0.309638	0.127125	0.105060	-0.160330	-0.202394	0.138342	0.280988	0.831461D-02
16	0.576244	0.246794	0.241467	0.247793	-0.234548	0.123497	0.484896	0.527193D-01
17	1.00000	0.234257	0.260035	0.354471	-0.118593	0.648569D-01	0.705976	0.153755
18		1.00000	0.830208	0.215618	-0.252498	-0.197567D-01	0.280360	0.971322D-01
19			1.00000	0.317612	-0.228267	0.160810D-01	0.257986	0.136774
20				1.00000	-0.361324	0.312393D-02	0.367930	0.114251
21					1.00000	0.444649D-01	-0.321608	-0.249086D-01
22						1.00000	0.907444D-02	0.310478D-01
23							1.00000	0.417556D-01
24								1.00000

VARIABLE NUMBER	25
1	0.674905D-01
2	0.118154
3	0.457679D-01
4	0.334718D-02
5	0.991901D-02
6	-0.142184
7	0.154233
8	0.563586D-01
9	-0.552528
10	-0.293407D-01
11	-0.432205D-01
12	-0.238644
13	0.916615
14	0.499749
15	0.624035D-02
16	0.491492D-01
17	0.146037
18	0.695295D-01
19	0.903635D-01
20	0.954555D-01
21	-0.127236D-01
22	0.252748D-01
23	0.598603D-01
24	0.924396
25	1.00000

Occupation Stratum 5 Black Males

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  VARIABLE                     MEAN                STANDARD DEVIATION

 SCHOOL      1            8.339350181              3.485009868
 WAGE        2            2.385234657             0.8013709036
 UN MEM      3           0.5523465704             0.4981522915
 MIG<50      4           0.4007220217             0.4909317361
 S.AT16      5           0.7184115523             0.4505877847
 EXP         6            30.02527076              12.65896359
 TRAIN       7           0.1227436823             0.3287366838
 PHY DM      8            2.194945848             0.4233789382
 NEG WT      9           0.1444043321D-01         0.1195134803
 GED        10            2.551624549             0.1241167192
 SVP        11            2.946931408             0.1306324041
 %BMOCC     12           0.8978339350D-01         0.6206562106D-01
 %WFOCC     13           0.2651732852             0.1161655441
 %BFOCC     14           0.2677256318D-01         0.6397087052D-02
 DA/PW      15            22.20990909              39.13718419
 NYL/PW     16            3.600650095              3.657186912
 AVEMPF     17           0.4236900120             0.2953215854
 FDSL       18           0.3848103571D-01         0.6827120625D-01
 FDSLEX     19           0.6608364079D-01         0.7877784405D-01
 ATPFAS     20           0.4584765343D-01         0.1833612801D-01
 MININD     21           0.3057716861             0.1555410360
 EDS16      22            5.501805054              4.538582225
 UNXMPF     23           0.2807524669             0.3346285613
 %FMOCC     24           0.2919458484             0.1191812678
 MINOCC     25           0.3817292419             0.9107372179D-01
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Occupation Stratum 5 Black Males

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CORRELATION MATRIX

VARIABLE     1               2               3               4               5               6               7               8
 NUMBER

   1      1.00000         0.264135        0.139996       -0.103064       -0.312712       -0.565397        0.232328       -0.106389
   2                      1.00000         0.570692       -0.174990       -0.276255       -0.553653D-01    0.162318       -0.309975D-01
   3                                      1.00000        -0.108306       -0.240785       -0.458876D-01    0.115497       -0.485603D-01
   4                                                      1.00000        -0.126835        0.380089D-01   -0.813721D-01   -0.460022D-01
   5                                                                      1.00000         0.161324       -0.132722        0.608657D-01
   6                                                                                      1.00000        -0.262814        0.175520
   7                                                                                                      1.00000        -0.163525D-01
   8                                                                                                                      1.00000
VARIABLE     9               10              11              12              13              14              15              16
 NUMBER

   1     -0.205071D-01   -0.104309       -0.494352D-01   -0.215242        0.233809       -0.161903D-01   -0.111416        0.100481
   2     -0.806142D-01   -0.207776       -0.481259D-02   -0.188613        0.210441        0.956238D-02    0.162213D-01    0.334962
   3     -0.134457       -0.257756       -0.100500D-01   -0.191349        0.188490       -0.818860D-02   -0.126132        0.149023
   4      0.862748D-01    0.160354D-01    0.333674D-01    0.670704D-01   -0.140802       -0.779259D-02    0.168385D-01   -0.204875D-01
   5      0.850125D-02    0.173075D-02    0.221997D-01    0.965334D-01    0.903439D-02    0.158707        0.112849       -0.104782
   6      0.261011D-01    0.175116       -0.660115D-01    0.229475       -0.144747        0.262584D-01    0.401535D-02   -0.675756D-01
   7     -0.452778D-01   -0.102585        0.762992D-01   -0.670601D-01    0.491571D-01    0.253833D-01   -0.225216D-01    0.543847D-01
   8     -0.558366D-01    0.552443       -0.316697        0.710469       -0.299122       -0.184235       -0.696063D-01    0.370715D-01
   9      1.00000        -0.504382D-01   -0.414881       -0.757755D-01   -0.249672       -0.450638        0.275773D-01   -0.281695D-01
  10                      1.00000        -0.246062        0.679542       -0.363919       -0.105630       -0.115032       -0.213042
  11                                      1.00000        -0.275046        0.149786        0.402164        0.358716D-01   -0.453568D-01
  12                                                      1.00000        -0.679247        0.411684D-01   -0.503984D-01   -0.147826
  13                                                                      1.00000         0.450006       -0.255081D-02    0.133718
  14                                                                                      1.00000         0.15519[illegible]D-01   -0.568762D-01
  15                                                                                                      1.00000         0.645331
  16                                                                                                                      1.00000
```

Occupation Stratum 5 Black Males (cont.)

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VARIABLE      17              18              19              20              21              22              23              24
 NUMBER

    1     0.109885       0.500751D-01    0.907994D-01    0.220755        0.164999D-01    0.311724       0.990768D-01    0.227024
    2     0.487381       0.177617        0.260968        0.438922       -0.316254       -0.104248       0.590793        0.205629
    3     0.318785       0.127685        0.199554        0.404758       -0.230575       -0.132652       0.755678        0.163281
    4     0.957574D-02   0.294420D-01    0.151910D-01   -0.762286D-01    0.828621D-01   -0.180011      -0.530222D-01   -0.137657
    5    -0.703839D-01  -0.121168       -0.157844       -0.265481       -0.353491D-01    0.760311      -0.199149        0.173244D-01
    6     0.427603D-01  -0.585682D-02   -0.453079D-01   -0.846844D-01   -0.672792D-01   -0.197103       0.612113D-01   -0.139568
    7     0.132335       0.305422D-01    0.706740D-01    0.639432D-01   -0.955349D-02   -0.171479D-01    0.129609        0.492757D-01
    8     0.101599       0.244604D-01    0.303321D-01    0.399168D-01    0.448548D-01    0.130152D-01    0.499452D-01   -0.301442
    9     0.601221D-01  -0.155308D-01   -0.299877D-01   -0.163527D-01    0.958134D-01    0.266704D-01   -0.101741       -0.267542
   10    -0.195163      -0.407397D-01   -0.893676D-01   -0.306390        0.345780       -0.339336D-01   -0.205184       -0.360381
   11    -0.950601D-01   0.562930D-02    0.659497D-02   -0.122371       -0.332037D-01    0.107882D-02   -0.543900D-01    0.167582
   12    -0.113676      -0.109699       -0.144810       -0.180854        0.130327       -0.450553D-01   -0.174218       -0.659850
   13     0.989693D-01   0.755425D-[illegible]    0.105752        0.111593       -0.557351D-01    0.151304       0.198396        0.998851
   14    -0.975845D-01  -0.128244       -0.135248       -0.145342       -0.738771D-03    0.113139      -0.517904D-01    0.492295
   15     0.343411      -0.341090D-02   -0.164124D-01   -0.234363D-01   -0.200744        0.227726D-01   -0.167228D-01   -0.165326D-02
   16     0.636181       0.165074        0.209108        0.576451       -0.335925       -0.628233D-01    0.447120        0.127281
   17     1.00000        0.226317        0.285080        0.542072       -0.359535       -0.121540D-01    0.725547        0.912271D-01
   18                    1.00000         0.963522        0.694857D-01   -0.272305       -0.104007       0.227842        0.667475D-01
   19                                    1.00000         0.172872       -0.291672       -0.117966       0.300084        0.958162D-01
   20                                                    1.00000        -0.371178       -0.130187       0.560346        0.100915
   21                                                                    1.00000         0.265577D-02   -0.338649       -0.543644D-01
   22                                                                                    1.00000        -0.136870        0.153548
   23                                                                                                    1.00000         0.190596
   24                                                                                                                    1.00000
VARIABLE      25
 NUMBER

    1     0.150404
    2     0.140554
    3     0.109444
    4    -0.134434
    5     0.884575D-01
    6    -0.262574D-01
    7     0.187627D-01
    8     0.897015D-01
    9    -0.401752
   10    -C.850305D-02
   11     0.318611D-01
   12    -C.182007
   13     0.844222
   14     0.672284
   15    -C.365094D-01
   16     C.658216D-01
   17     0.419131D-01
   18     0.125885D-01
   19     0.267010D-01
   20     0.880960D-02
   21     C.176733D-01
   22     C.170232
   23     C.130691
   24     0.858945
   25     1.00000
```

Occupation Stratum 5 White Females

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  VARIABLE                      MEAN               STANDARD DEVIATION

 SCHOOL     1               9.945762712             2.273129195
 WAGE       2               2.009728814            0.7220576661
 UN MEM     3              0.4135593220            0.4933081536
 MIG<50     4              0.5084745763            0.5007776726
 S.AT16     5              0.2745762712            0.4470588771
 EXP        6               29.93220339             10.35141780
 TRAIN      7              0.7457627119D-01        0.2631527972
 PHY DM     8               2.010169492            0.5182699226
 NEG WT     9              0.0                     0.0
 GED       10               2.604406780            0.1873941532
 SVP       11               2.920338983            0.1832990021
 %BMOCC    12              0.4628474576D-01        0.2737159756D-01
 %WFOCC    13              0.4568813559            0.2421427036
 %SFOCC    14              0.2898644068D-01        0.1093361940D-01
 DA/PW     15               15.41429604             19.78509317
 NYL/PW    16               2.754127423             2.721771670
 AVEMPF    17              0.3942307345            0.2836196155
 FDSL      18              0.2957724517D-01        0.3304955544D-01
 FDSLEX    19              0.7515334461D-01        0.6543335309D-01
 ATPFAS    20              0.4458135593D-01        0.1697991886D-01
 MININD    21              0.4507537258            0.1729861367
 EDS16     22               2.742372881             4.639530068
 UNXMPF    23              0.1864183051            0.2918672178
 %FMOCC    24              0.4858677966            0.2479661887
 MINOCC    25              0.5321525424            0.2263212915
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Occupation Stratum 5 White Females

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CORRELATICN MATRIX

VARIABLE     1            2               3               4               5               6               7               8
 NUMBER

    1     1.00000      0.191183      -0.921598D-01   0.936922D-02   0.113573D-01  -0.453043        0.194129      -0.218955
    2                  1.00000        0.251266      -0.270848D-01  -0.139594      -0.128065        0.964132D-01  -0.120515
    3                                 1.00000       -0.555411D-01  -0.192762       0.674560D-01    0.236256D-01   0.143141
    4                                                1.00000        0.427464D-01   0.690077D-01  -0.481216D-02  -0.986240D-01
    5                                                               1.00000       -0.657888D-01    0.566482D-01  -0.708133D-01
    6                                                                              1.00000        -0.106771        0.369016D-01
    7                                                                                              1.00000       -0.130277
    8                                                                                                              1.00000

VARIABLE     9            10              11              12              13              14              15              16
 NUMBER

    1     C.0          0.342319      -0.339765D-01  -0.330762       0.343219       0.135184        0.167503        0.118424
    2     0.0          0.122530      -0.825905D-02  -0.200210       0.144312      -0.134457        0.327002        0.449208
    3     0.0         -0.141202       0.270326D-01   0.663164D-01  -0.926725D-01  -0.156613        0.565249D-01    0.982901D-01
    4     0.0         -0.203342D-01  -0.389392D-01   0.974920D-02  -0.648531D-02  -0.204791D-01   0.119926        0.104411
    5     0.0         -0.388527D-01  -0.434775D-01   0.419546D-01  -0.618797D-01  -0.101528        0.884155D-01    0.272250D-01
    6     0.0         -0.624441D-01   0.428562D-01   0.979670D-01  -0.764379D-01  -0.522704D-01   0.194810D-01   -0.109098D-01
    7     C.0          0.207134      -0.527073D-01  -0.235291       0.203355      -0.173799D-01   0.114647        0.140891D-01
    8     0.0         -0.658876       0.855665D-02   0.332597      -0.505958      -0.262285       -0.445083       -0.158494
    9     0.0          0.0            0.0            0.0            0.0            0.0             0.0             0.0
   10                  1.00000        0.242959      -0.659990       0.874771       0.461203        0.432341        0.802388D-01
   11                                 1.00000        0.434691       0.358043D-01   0.398297        0.941195D-01    0.164514D-01
   12                                                1.00000       -0.826596      -0.969461D-01  -0.352142       -0.118796
   13                                                               1.00000        0.516449        0.402301        0.723527D-01
   14                                                                              1.00000        -0.226119       -0.216895
   15                                                                                              1.00000         0.695803
   16                                                                                                              1.00000
```

Occupation Stratum 5 White Females (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.2[illegible]9072	-0.233149D-01	-0.171063D-01	0.106163	-0.981160D 01	0.161542	0.350672D-01	0.341119
2	0.481646	0.160513	0.159579	0.405870	-0.332060	-0.103524	0.356742	0.134994
3	0.167677	0.102354	0.882953D-01	0.199359	-0.146249	-0.161350	0.761875	-0.974016D-01
4	0.119946D-01	-0.120251	-0.151551	0.2267[illegible]D-01	0.890179D-01	0.448822D-01	-0.261504D-01	-0.723599D-02
5	-0.822717D-02	-0.584895D-01	-0.133531	-0.1126[illegible]	0.154020	0.962397	-0.940553D-01	-0.649031D-01
6	-0.121134D-01	-0.1221[illegible]0D-01	-0.750294D-01	-0.918829D-01	0.843388D-01	-0.132664	0.232433D-01	0.769475D-01
7	0.126099	-0.733240D-01	-0.500222D-01	-0.311325D-02	0.435824D-01	0.882244D-01	0.847471D-01	0.197812
8	-0.130076	0.245412	0.372674	0.140016	-0.239991	-0.979262D-01	0.317437D-01	0.505641
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.197000	-0.294203	-0.403721	-0.2756[illegible]	0.272286	0.106995D-01	0.256940D-02	0.874563
11	0.661121D-01	-0.104144	-0.113359	-0.1022[illegible]	0.855054D-01	-0.522120D-01	0.152532D-01	0.525256D-01
12	-0.236499	0.119912	0.164378	0.657564D-01	-0.458022D-01	-0.412322D-01	-0.904136D-01	0.811458
13	0.197097	-0.242919	-0.331169	-0.245685	0.207660	-0.116959D-01	0.377037D-01	0.999287
14	-0.277639	-0.134136	-0.221297	-0.331743	0.189869	-0.954848D-01	-0.236292	0.548414
15	0.705330	-0.251553	-0.290926	0.203538	-0.862789D-01	0.928476D-01	0.351011	0.382883
16	0.721180	0.503987D-01	0.495011D-01	0.639349	-0.398302	0.111478D-01	0.397502	0.610899D-01
17	1.00000	0.901450D-01	0.208181	0.549796	-0.416014	0.722616D-02	0.559456	0.180226
18		1.00000	0.812021	0.357074	-0.321063	-0.342779D-01	0.121411	0.243128
19			1.00000	0.506030	-0.401020	-0.113934	0.135169	0.333149
20				1.00000	-0.658687	-0.108813	0.372361	0.254543
21					1.00000	0.151716	-0.286496	0.211155
22						1.00000	-0.757082D-01	0.156315D-01
23							1.00000	0.263964D-01
24								1.00000

VARIABLE NUMBER	25
1	0.333741
2	0.123691
3	-0.986955D-01
4	-0.674894D-02
5	-0.660363D-01
6	-0.724584D-01
7	0.188274
8	-0.513775
9	0.0
10	0.878384
11	0.110121
12	-0.768123
13	0.994887
14	0.589138
15	0.376912
16	0.525651D-01
17	0.168619
18	-0.251878
19	-0.345131
20	-0.270434
21	0.225810
22	-0.184849D-01
23	0.179862D-01
24	0.997499
25	1.00000

Occupation Stratum 5 Black Females

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	10.13291139	2.501221180
WAGE	2	1.863670886	0.6710722995
UN MEM	3	0.4683544304	0.5005841947
MIG<50	4	0.3924050633	0.4898386975
S.AT16	5	0.6392405063	0.4817478056
EXP	6	25.34177215	11.21462430
TRAIN	7	0.2050632888D 12	0.3786999960D 12
PHY DM	8	2.056962025	0.4259671780
NEG WT	9	0.0	0.0
GED	10	2.581645570	0.1599516677
SVP	11	2.956329114	0.1388916749
%BMOCC	12	0.5706329114D-01	0.3304594053D-01
%WFOCC	13	0.4154746835	0.2300809522
%BFOCC	14	0.3055696203D-01	0.1020895927D-01
DA/PW	15	10.09615030	15.44776192
NYL/PW	16	1.925543429	2.300089160
AVEMPF	17	0.3171822785	0.2860453859
FDSL	18	0.3180768129D-01	0.4589157883D-01
FDSLEX	19	0.6743929055D-01	0.6728081324D-01
ATPFAS	20	0.4133037975D-01	0.1599309448D-01
MININD	21	0.4802458420	0.2010955900
EDS16	22	6.291139241	5.171336726
UNXMPF	23	0.1942523207	0.2957062699
%FMOCC	24	0.4460316456	0.2366982389
MINOCC	25	0.5030949367	0.2136437534

Occupation Stratum 5 Black Females

CORRELATICN MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	0.330037	0.720567D-01	0.195445D-01	-0.155536	-0.601781	-0.834250D-01	-0.715117D-02
2		1.00000	0.376338	-0.925736D-01	-0.118424	-0.102477D-01	-0.129525	-0.225726D-01
3			1.00000	-0.156842	-0.608482D-01	0.927060D-01	-0.260287D-01	-0.642790D-02
4				1.00000	-0.367973	-0.918189D-01	-0.391172D-02	-0.467551D-01
5					1.00000	0.524409D-01	-0.318193D-01	0.162855
6						1.00000	0.117380D-01	0.173232
7							1.00000	0.692732D-01
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	0.0	0.151014	-0.876929D-01	-0.176416	0.160441	-0.505606D-01	0.225120	0.185420
2	C.0	-0.863597D-01	-0.101048	-0.649938D-01	-0.108063	-0.341543	0.267360	0.255614
3	0.0	-0.154466	0.670267D-01	0.247644D-01	-0.166798	-0.258264	0.174989	0.167811
4	0.0	-0.131717D-01	0.756075D-01	0.177492	-0.100339	-0.325196D-01	0.360741D-01	0.654244D-01
5	0.0	-0.947443D-01	-0.560915D-01	-0.107382	0.132201D-01	0.133066	-0.268251	-0.231445
6	0.0	-0.232964	-0.134706	0.198862	-0.245448	-0.182203	-0.161202	-0.106486
7	0.0	-0.794228D-01	0.623566D-01	0.287307D-01	-0.388226D-01	0.562692D-01	-0.791654D-01	-0.488835D-02
8	0.0	-0.480021	-0.749521D-03	0.288881	-0.358630	-0.222650	-0.381697	-0.723276D-01
9	C.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10		1.00000	0.127112	-0.436718	0.894942	0.658479	0.406500	0.498983D-01
11			1.00000	0.236798	-0.241665D-02	0.340240	-0.745824D-02	0.100772D-01
12				1.00000	-0.744995	-0.215922	-0.253543	-0.114174
13					1.00000	0.635320	0.325229	0.322936D-01
14						1.00000	-0.287287	-0.346209
15							1.00000	0.730841
16								1.00000

Occupation Stratum 5 Black Females (cont.)

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VARIABLE      17             18             19             20             21             22             23             24
 NUMBER

    1    0.275240       0.380211D-01   0.146603       0.133330      -0.175940       0.187068       0.154735       0.153775
    2    C.451500       0.158436       0.216325       0.326128      -0.365326       0.158053D-02   0.420861      -0.119773
    3    0.321180       0.457775D-01   0.118013       0.276737      -0.182438      -0.161021D-01   0.702115      -0.173274
    4   -C.482706D-01  -0.441107D-01  -0.954248D-01   0.630244D-01  -0.263729D-01  -0.354666      -0.908371D-01  -0.989366D-01
    5   -0.148201       0.195024D-01   0.151034D-02  -0.123483       0.918804D-03   0.916815      -0.820153D-01   0.185898D-01
    6   -0.813512D-01   0.714380D-01  -0.128727D-01   0.786817D-02  -0.116757D-01  -0.162185       0.126560D-01  -0.246445
    7   -C.113654      -0.191828D-01  -0.150911D-01  -0.123930D-01   0.126982      -0.423881D-01  -0.487442D-01  -0.353103D-01
    8    C.539963D-01  -0.127928D-01   0.148754       0.184866      -0.299618       0.174587      -0.487987D-01  -0.358207
    9    0.0            0.0            0.0            0.0            0.0            0.0            0.0            0.0
   10    C.871609D-01  -0.367156D-01  -0.196321      -0.336911       0.170767      -0.681917D-01   0.331576D-01   0.898323
   11   -0.172316D-01  -0.343289D-01  -0.127170D-01  -0.152060       0.168559      -0.628836D-01   0.216146D-01   0.123257D-01
   12   -0.789944D-01   0.150132D-01   0.423583D-01   0.128112      -0.575040D-01  -0.130783      -0.129714      -0.733480
   13    0.399860D-01  -0.718760D-01  -0.182192      -0.342419       0.157272       0.336192D-01   0.343991D-01   0.999445
   14   -C.369259      -0.950933D-02  -0.140447      -0.533431       0.308393       0.121175      -0.280583       0.660689
   15    C.671823      -0.142104      -0.108816       0.380806      -0.232563      -0.226938       0.496814       0.303746
   16    C.694149      -0.623766D-01   0.108392       0.713234      -0.411385      -0.194979       0.439377       0.164587D-01
   17    1.00000        0.622497D-01   0.300663       0.592817      -0.558036      -0.780048D-01   0.749664       0.229417D-01
   18                   1.00000        0.823152      -0.160958D-01  -0.141136       0.673823D-01   0.162388D-01  -0.702767D-01
   19                                  1.00000        0.300802      -0.341625       0.846382D-01   0.148684      -0.183156
   20                                                 1.00000       -0.657822      -0.711446D-01   0.391103      -0.355853
   21                                                                1.00000       -0.393313D-01  -0.347218       0.166176
   22                                                                               1.00000       -0.389765D-01   0.379057D-01
   23                                                                                              1.00000        0.213357D-01
   24                                                                                                             1.00000
VARIABLE      25
 NUMBER

    1     C.143082
    2    -C.142751
    3    -0.188142
    4    -C.821588D-01
    5     C.398614D-02
    6    -C.242279
    7    -C.346766D-01
    8    -0.352178
    9     C.0
   10     C.927712
   11     0.502832D-01
   12    -C.657953
   13     C.992062
   14     C.698586
   15     C.247306
   16     C.574650D-03
   17     0.131987D-01
   18    -C.755381D-01
   19    -C.156369
   20    -C.374438
   21     0.175214
   22     C.217669D-01
   23     C.357410D-02
   24     C.994458
   25     1.00000
```

Occupation Stratum 5 Cross Race-Sex

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	9.687727825	2.627930192
WAGE	2	2.480206561	0.9147806731
UNION	3	0.5212636695	0.4998514205
MIG<50	4	0.5030376671	0.5002948107
S 16	5	0.3037667072	0.4601627809
EXP	6	29.69380316	11.61176717
RACE	7	0.1117861482	0.3152947765
SEX	8	0.3888213852	0.4877790632
TRAIN	9	0.1081409478	0.3107471877
PHY DM	10	2.077764277	0.4229186710
NEG WT	11	0.1701093560D-01	0.1293905182
SVP	12	2.927339004	0.1714929166
%BMOCC	13	0.6446901580D-01	0.4253584376D-01
%WFOCC	14	0.3444240583	0.1902614573
%BFOCC	15	0.2696233293D-01	0.8365715598D-02
DA/PW	16	24.00595430	55.95157687
AVEMPF	17	0.4221124342	0.2803493161
FDSL	18	0.3459302204D-01	0.4481312654D-01
ATPFAS	19	0.4773171324D-01	0.1667134298D-01
%MININ	20	0.3475637908	0.1746140554
EDS16	21	2.772782503	4.497702891
UNXMPF	22	0.2520893884	0.3181097695
%FMOCC	23	0.3713863913	0.1942210881
%MINOC	24	0.4358554070	0.1707343442
RAXSEX	25	0.3402187120D-01	0.1813956022

Occupation Stratum 5 Cross Race-Sex

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CORRELATION MATRIX

VARIABLE       1              2              3              4              5              6              7              8
 NUMBER

   1      1.00000        0.243556      -0.259644D-01  -0.991872D-02  -0.140773      -0.469836      -0.855553D-01   0.749061D-01
   2                     1.00000        0.276780      -0.849171D-01  -0.181035      -0.102838      -0.130286       -0.421571
   3                                    1.00000        0.582234D-02  -0.165631       0.457677D-01  -0.15[illegible]D-0  -0.178649
   4                                                   1.00000       -0.885624D-01   0.602619D-01  -0.719[illegible]63D-0  0.200800D-01
   5                                                                  1.00000        0.110535D-01   0.235227      -0.227927D-01
   6                                                                                 1.00000       -0.434730D-0   -0.135352D-01
   7                                                                                                1.00000       -0.614748D-01
   8                                                                                                               1.00000
VARIABLE       9             10             11             12             13             14             15             16
 NUMBER

   1      0.211232      -0.155450       0.657300D-01  -0.148667      -0.293755       0.235451      -0.284806D-01   0.911274D-01
   2      0.1[illegible]6712  -0.499451D-01   0.444740D-01  -0.464945D-01  -0.520544D-01  -0.630770D-01  -0.167245       0.230333
   3     -0.109060D-01   0.957549D-01  -0.432192D-01   0.393339D-01   0.441604D-01  -0.114308      -0.901411D-01   0.866676D-01
   4     -0.373289D-01  -0.471154D-01  -0.383855D-01   0.139192D-01   0.942273D-02  -0.838426D-04   0.112181D-01  -0.277507D-02
   5      0.167155D-01  -0.402641D-01  -0.460282D-01   0.302962D-01   0.671715D-01  -0.448818D-01   0.206730D-01   0.577753D-01
   6     -0.275366       0.771908D-01   0.747251D-01   0.431244D-01   0.173597      -0.121620      -0.422480D-01  -0.232976D-01
   7     -0.117830D-01   0.442089D-01  -0.466686D-01   0.356568D-01   0.136596      -0.860469D-01   0.394184D-01  -0.364776D-01
   8     -0.770903D-01  -0.105469      -0.104925      -0.312457D-01  -0.301677       0.435640       0.187836      -0.123942
   9      1.00000       -0.548101D-01  -0.155510D-01  -0.988859D-02  -0.114195       0.123937       0.110084D-02   0.107470D-01
  10                     1.00000        0.202596D-01  -0.276713D-01   0.446536      -0.395830      -0.232645      -0.982477D-01
  11                                    1.00000       -0.262215      -0.275341D-01  -0.218548      -0.363547      -0.177305D-01
  12                                                   1.00000        0.204105      -0.457350D-01   0.448276       0.373011D-01
  13                                                                  1.00000       -0.641743       0.878809D-02  -0.114568D-02
  14                                                                                 1.00000        0.456257       0.179002D-01
  15                                                                                                1.00000       -0.427412D-01
  16                                                                                                               1.00000
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Occupation Stratum 5 Cross Race-Sex (cont.)

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VARIABLE      17             18             19             20             21             22             23             24
 NUMBER

    1    0.186204       0.520558D-01   0.118067      -0.674594D-01   0.873432D-01   0.453555D-01   0.229424       0.187799
    2    0.371430       0.175166       0.327375      -0.411236      -0.121176       0.336350      -0.689948D-01  -0.914545D-01
    3    0.229043       0.128379       0.254193      -0.244133      -0.139893       0.759908      -0.115860      -0.120796
    4   -0.388764D-01  -0.609612D-01   0.289486D-01   0.794256D-01  -0.783972D-01  -0.191080D-01   0.101067D-03   0.280377D-02
    5   -0.105822D-01  -0.230237D-01  -0.972294D-01   0.666255D-01   0.933891      -0.713525D-01  -0.430763D-01  -0.322673D-01
    6   -0.437771D-01  -0.471951D-01  -0.121731       0.457194D-01  -0.997498D-01   0.201319D-01  -0.120961      -0.943538D-01
    7   -0.549153D-01   0.718710D-01  -0.286565D-01  -0.389982D-01   0.167202      -0.362268D-01  -0.825947D-01  -0.599259D-01
    8   -0.733856D-01  -0.751860D-01  -0.137939       0.450475       0.181383D-01  -0.168265       0.434849       0.419510
    9    0.624747D-01   0.972291D-03  -0.123338D-01  -0.278865D-01   0.646048D-01   0.731282D-02   0.121458       0.109716
   10   -0.731165D-01   0.120315       0.112442      -0.178646      -0.783192D-01   0.580013D-01  -0.397781      -0.341254
   11   -0.115046D-01  -0.144672D-01  -0.265313D-01  -0.268666D-01  -0.393396D-01  -0.512865D-01  -0.229722      -0.268183
   12   -0.847813D-01  -0.512487D-01  -0.901674D-01   0.624005D-01  -0.769061D-03  -0.113934D-01  -0.254940D-01   0.218487D-01
   13   -0.890814D-01  -0.221867D-01  -0.915143D-03  -0.123538      -0.599832D-02   0.810838D-02  -0.628281      -0.465575
   14    0.123061      -0.884215D-01  -0.140467       0.291270       0.790753D-02  -0.332037D-01   0.999265       0.976847
   15   -0.168755      -0.737470D-01  -0.186146       0.165207       0.151820D-02  -0.119123       0.490028       0.559627
   16    0.380321       0.512151D-01  -0.642253D-01  -0.186379       0.787682D-01   0.271952       0.156943D-01   0.175678D-01
   17    1.00000        0.155749       0.449651      -0.341802       0.228134D-01   0.653504       0.113283       0.106673
   18                   1.00000        0.187845      -0.259260      -0.141693D-01   0.203566      -0.897954D-01  -0.107675
   19                                  1.00000       -0.483813      -0.823380D-01   0.401696      -0.145621      -0.165881
   20                                                 1.00000        0.755468D-01  -0.335919       0.292448       0.301901
   21                                                                1.00000       -0.514211D-01   0.781171D-02   0.739193D-02
   22                                                                               1.00000       -0.376578D-01  -0.406180D-01
   23                                                                                              1.00000        0.981036
   24                                                                                                             1.00000
VARIABLE      25
 NUMBER

    1    0.146580D-01
    2   -0.129807
    3   -0.482396D-01
    4   -0.114018D-02
    5    0.363562D-01
    6   -0.759077D-01
    7    0.529006
    8    0.235291
    9   -0.603146D-03
   10    0.289025D-01
   11   -0.246880D-01
   12    0.526021D-02
   13    0.211068D-01
   14    0.262299D-01
   15    0.473427D-01
   16   -0.375103D-01
   17   -0.280994D-01
   18    0.800880D-02
   19   -0.312525D-01
   20    0.753766D-01
   21    0.408000D-01
   22   -0.575661D-01
   23    0.277344D-01
   24    0.368080D-01
   25    1.00000
```

Occupation Stratum 6-9 White Males

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	9.580645161	2.648425271
WAGE	2	2.957385305	0.9801637881
UNION	3	0.5591397849	0.4973823332
MIG<50	4	0.4587813620	0.4991935427
S. 16	5	0.3046594982	0.4610901325
EXP	6	29.75985663	11.93611749
TRAIN	7	0.1541218638	0.3617143426
PHY DM	8	3.043010753	0.7621530251
NEG WT	9	1.161290323	1.202129309
SVP	10	4.787813620	1.150318327
%BMOCC	11	0.8205734767D-01	0.4642519637D-01
%WFOCC	12	0.5764874552D-01	0.1240910489
%BFOCC	13	0.4956989247D-02	0.7893509735D-02
DA/PW	14	32.33875729	77.18080955
AVEMPF	15	0.3782497013	0.2682779131
FDSL	16	0.2912054644D-01	0.3584687099D-01
ATPFAS	17	0.4422759857D-01	0.1603293345D-01
%MININ	18	0.2515825161	0.1408329677
ECS16	19	2.630824373	4.241358082
UNXMPF	20	0.2454726404	0.3017121389
%FMOCC	21	0.6260573477D-01	0.1302293581
%MINOC	22	0.1446630824	0.1224613627

Occupation Stratum 6-9 White Males

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CORRELATICN MATRIX

VARIABLE     1            2            3             4             5             6             7            8
 NUMBER

   1      1.00000      0.250427     0.994511D-01  0.344929D-01 -0.216698     -0.450620      0.214152     -0.707080D-02
   2                   1.00000      0.423092      0.363224D-01 -0.125997     -0.118761      0.100352      0.451925D-01
   3                                1.00000       0.180062     -0.196482     -0.148674D-01  0.391280D-01  0.976454D-01
   4                                              1.00000      -0.109339     -0.291357D-01  0.253481D-01  0.424950D-01
   5                                                            1.00000       0.283736D-01 -0.131571      0.157061
   6                                                                          1.00000      -0.233012     -0.510549D-01
   7                                                                                        1.00000       0.150123D-01
   8                                                                                                      1.00000
VARIABLE     9            10           11            12            13            14            15           16
 NUMBER

   1     -0.630272D-01  0.636167D-01  0.149120D-01 -0.974579D-01 -0.912510D-02  0.125968      0.781537D-01  0.932816D-01
   2      0.190204      0.169196     -0.165494     -0.588137D-01 -0.101947      0.107939      0.151774      0.184685D-01
   3      0.287432      0.129520     -0.119475      0.132761D-01 -0.570710D-01  0.371042D-01  0.255555      0.466780D-01
   4     -0.338385D-01 -0.415954D-01 -0.292332D-01  0.114684      0.260221D-01 -0.702576D-01  0.179782D-01 -0.121469D-01
   5      0.177103     -0.295973D-01 -0.110214     -0.104244     -0.127834      0.582814D-02 -0.187443D-01 -0.100639
   6      0.849362D-01  0.442447D-01 -0.717764D-01  0.765024D-01  0.741859D-01 -0.103540     -0.332236D-01 -0.829680D-01
   7     -0.242839D-01  0.451623D-01 -0.491534D-01 -0.240337D-01  0.484975D-02  0.634520D-01 -0.359649D-01 -0.329702D-01
   8      0.604873      0.113431     -0.904476D-01 -0.364054     -0.542603      0.830197D-01  0.918893D-01 -0.177688D-01
   9      1.00000       0.449626     -0.318569     -0.170175     -0.339303      0.926724D-01  0.313317      0.748710D-01
  10                    1.00000      -0.496038     -0.313811D-01 -0.979483D-01 -0.528962D-01  0.126641D-01 -0.104050
  11                                  1.00000      -0.347068     -0.162800      0.133902      0.846500D-01 -0.106087D-01
  12                                                1.00000       0.765068     -0.881607D-01 -0.125579      0.307390D-01
  13                                                              1.00000      -0.131278     -0.125043      0.986422D-01
  14                                                                            1.00000       0.455112      0.232623
  15                                                                                          1.00000       0.294608
  16                                                                                                        1.00000
VARIABLE     17           18           19            20            21            22
 NUMBER

   1      0.134912     -0.123391D-02 -0.320850D-01  0.119054     -0.934173D-01 -0.936898D-01
   2      0.595273D-01 -0.142724     -0.551416D-01  0.345189     -0.622208D-01 -0.128906
   3      0.121969     -0.235617     -0.160550      0.723736      0.919111D-02 -0.355188D-01
   4      0.906406D-02 -0.445572D-01 -0.930101D-01  0.118822      0.110856      0.106806
   5     -0.120451     -0.119399      0.938767     -0.107073     -0.107079     -0.155653
   6     -0.412305D-02  0.262227D-01 -0.410502D-01  0.232166D-03  0.742988D-01  0.571184D-01
   7      0.923035D-01 -0.451055D-01 -0.124562     -0.971100D-02 -0.226069D-01 -0.426750D-01
   8     -0.937674D-01 -0.382757      0.161831      0.783818D-01 -0.379783     -0.438162
   9      0.905657D-01 -0.355954      0.176103      0.359667     -0.182720     -0.315060
  10      0.295974      0.343176D-01 -0.704247D-03  0.661438D-01 -0.358389D-01 -0.226161
  11     -0.298569D-01 -0.495915D-01 -0.106250      0.513901D-01 -0.340577      0.169207D-01
  12     -0.102807D-01  0.458779     -0.944957D-01 -0.117316      0.999238      0.931048
  13      0.110322      0.453632     -0.114581     -0.124959      0.799619      0.777989
  14     -0.171129     -0.191164      0.170755D-01  0.267411     -0.919624D-01 -0.470350D-01
  15      0.348564     -0.292175     -0.117336D-01  0.720508     -0.127239     -0.103220
  16      0.172754     -0.153579     -0.934220D-01  0.213956      0.352691D-01  0.334845D-01
  17      1.00000       0.664915D-01 -0.794237D-01  0.244238     -0.310924D-02 -0.146260D-01
  18                    1.00000      -0.823405D-01 -0.288295      0.464650      0.475324
  19                                  1.00000      -0.774247D-01 -0.969867D-01 -0.143418
  20                                                1.00000      -0.119360     -0.107449
  21                                                              1.00000       0.934319
  22                                                                            1.00000
```

Occupation Stratum 6-9 Black Males

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	8.849462366	2.940660643
WAGE	2	2.359516129	0.9417902918
UNION	3	0.4354838710	0.4971584469
MIG<50	4	0.4731182796	0.5006244285
S. 16	5	0.6989247312	0.4599634824
EXP	6	28.26344086	11.86092640
TRAIN	7	0.1075268817	0.3106180619
PHY DM	8	2.903225806	0.6668119574
NEG WT	9	0.7096774194	1.153894886
SVP	10	4.330645161	0.9272316326
%BMOCC	11	0.1576666667	0.3742345942D-01
%WFOCC	12	0.3860215054D-01	0.5343015441D-01
%BFOCC	13	0.5172043011D-02	0.6628560083D-02
DA/PW	14	21.80380573	43.42801756
AVEMPF	15	0.3162598566	0.2689391596
FOSL	16	0.4724600948D-01	0.1094840047
ATPFAS	17	0.3994892473D-01	0.1661268886D-01
%MININ	18	0.2820625306	0.1482013648
FOS16	19	5.741935484	4.470693098
UNXMPF	20	0.1923949821	0.2891673161
%FMOCC	21	0.4377419355D-01	0.5933917698D-01
%MINOC	22	0.1514408602	0.5520535861D-01

Occupation Stratum 6-9 Black Males

CORRELATION MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	0.194643	0.100544	0.302819D-01	-0.329417	-0.459601	0.207165	0.421499D-01
2		1.00000	0.477591	-0.255269	-0.274858	-0.234093D-01	0.363951D-01	0.600045D-01
3			1.00000	-0.224187	-0.274505	0.124357	0.101622D-01	-0.515459D-01
4				1.00000	-0.822663D-01	-0.911991D-01	-0.508330D-01	0.893197D-01
5					1.00000	0.100817	-0.112667	0.102332D-01
6						1.00000	-0.216070	-0.130032
7							1.00000	0.180998
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	-0.479957D-01	-0.266475D-01	-0.130621	0.630216D-01	0.656716D-01	0.860678D-01	0.144392D-01	-0.325911D-01
2	0.122261	0.211812	-0.159516	0.874484D-01	0.410905D-01	0.510272D-01	0.346695	0.112910
3	0.212159	0.275766	-0.222936	0.470526D-01	0.509541D-01	-0.373977D-02	0.411086	0.922184D-01
4	-0.107156	-0.193264	0.111464	-0.539540D-01	-0.112622	-0.184972D-01	-0.891269D-01	-0.169384
5	-0.535506D-01	0.527406D-02	0.531745D-01	-0.574677D-01	-0.591541D-01	0.291403D-01	-0.125154	0.215928D-01
6	0.372146D-01	-0.382885D-01	0.989114D-01	-0.221042D-01	-0.113050D-01	-0.781686D-02	0.630004D-01	0.477960D-01
7	0.102649	0.104858	-0.120591	-0.736218D-01	-0.119297	-0.427600D-01	0.613333D-01	0.807037D-01
8	0.412930	0.205900	-0.411561D-02	-0.363238	-0.594231	0.326716D-01	0.840891D-02	0.629758D-01
9	1.00000	0.634824	-0.404942	-0.987644D-01	-0.250678	-0.294264D-01	0.339992	0.254176
10		1.00000	-0.503993	0.354236D-01	-0.724513D-01	-0.301191D-01	0.239644	0.349893
11			1.00000	-0.426921	-0.336059	0.139733	-0.209831	-0.225793
12				1.00000	0.878713	-0.162028	-0.217324D-01	-0.870782D-01
13					1.00000	-0.168115	-0.425247D-01	-0.151410
14						1.00000	0.333302	-0.372355D-01
15							1.00000	0.138210
16								1.00000

VARIABLE NUMBER	17	18	19	20	21	22
1	0.524549D-01	0.672619D-01	0.155736	0.571040D-01	0.540818D-01	-0.196669D-01
2	0.277440	-0.131105	-0.155568	0.456465	0.833303D-01	-0.186653D-01
3	0.346244	-0.123963	-0.194793	0.759569	0.480589D-01	-0.994017D-01
4	-0.234665D-01	0.607312D-01	-0.104552	-0.167488	-0.611619D-01	0.981920D-02
5	-0.237664	-0.953971D-01	0.845233	-0.176426	-0.583529D-01	-0.266757D-01
6	0.476316D-01	-0.613023D-01	-0.940227D-01	0.121921	-0.211659D-01	0.443008D-01
7	0.191921D-01	0.147451	-0.421395D-01	0.213410D-01	-0.796167D-01	-0.167327
8	-0.194670D-01	-0.267111	0.476003D-01	0.328205D-02	-0.393446	-0.425698
9	0.140611	-0.267139	-0.345105D-01	0.283422	-0.116932	-0.400196
10	0.115685	-0.196458	0.157401D-01	0.238517	0.238028D-01	-0.316069
11	-0.178213	-0.610305D-01	0.131170D-01	-0.137822	-0.421948	0.224351
12	0.206466	0.323963	-0.376117D-01	-0.212959D-01	0.948577	0.783443
13	0.195624	0.422345	-0.475634D-01	-0.423087D-01	0.902917	0.742715
14	-0.730133D-01	-0.169759	0.820670D-01	0.189379	-0.164673	-0.822740D-01
15	0.526126	-0.243096	-0.866914D-01	0.767123	-0.243190D-01	-0.168384
16	-0.248925	-0.216907	-0.606013D-02	0.898902D-01	-0.953204D-01	-0.255522
17	1.00000	-0.398969D-01	-0.145557	0.506886	0.207758	0.102505
18		1.00000	-0.754643D-01	-0.259967	0.338791	0.322788
19			1.00000	-0.116704	-0.391791D-01	-0.332209D-01
20				1.00000	-0.239014D-01	-0.153015
21					1.00000	0.788844
22						1.00000

Occupation Stratum 6-9 White Females

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	9.358490566	2.662575478
WAGE	2	1.836603774	0.4807254177
UNION	3	0.4339622642	0.4979743333
MIG<50	4	0.5188679245	0.5020174931
S. 16	5	0.2452830189	0.4322988551
EXP.	6	31.50943396	10.74841753
TRAIN	7	0.2830188679D-01	0.1666217370
PHY DM	8	2.103773585	0.6313891756
NEG WT	9	0.2641509434	0.7721569886
SVP	10	4.350943376	0.7814815335
%BMOCC	11	0.1906603774D-01	0.2810160777D-01
%WFOCC	12	0.6829849057	0.3373166414
%BFOCC	13	0.3789622642D-01	0.1875350342D-01
DA/PW	14	5.610226937	16.93925066
AVEXPE	15	0.1637443396	0.1907930502
EDSL	16	0.2232950981D-01	0.1979069947D-01
ATREAS	17	0.3546886792D-01	0.1222889913D-01
%MININ	18	0.6332332927	0.1809724475
EDS16	19	2.462264151	4.433142028
UNXPRE	20	0.5027339937D-01	0.1227337796
%FMOCC	21	0.7269811321	0.3525912508
%MINOC	22	0.7469471698	0.3278890414

Occupation Stratum 6-9 White Females

CORRELATION MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	-0.144142	-0.348304	0.123143	0.146281	-0.350210	0.105716	0.229813D-01
2		1.00000	0.316927	-0.200206	-0.179723	0.487954D-01	0.137946	0.619259D-02
3			1.00000	-0.299740	-0.366445	0.299936	-0.149431	0.685823D-02
4				1.00000	0.223561D-01	-0.106234D-01	0.504834D-01	-0.111399
5					1.00000	-0.244412	0.349259D-01	-0.941434D-01
6						1.00000	-0.985304D-01	0.847576D-01
7							1.00000	-0.118711
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	0.137724D-01	0.159203	0.279335	-0.227374	-0.121439	0.113343	0.210243	-0.191192
2	0.396761D-01	-0.346193D-02	0.527570D-01	-0.410837D-01	-0.236695D-01	0.118163	0.150131	0.112978
3	-0.335070D-01	-0.165452	-0.233725	0.240064	0.171127	-0.144582	-0.248516	0.352245
4	-0.127738D-01	-0.637422D-01	0.448042D-01	-0.453118D-01	-0.468295D-01	-0.722535D-01	0.377972D-01	-0.114568
5	-0.513962D-01	0.934810D-01	-0.554395D-01	0.681062D-01	0.548585D-01	0.191742	0.165521D-01	-0.125627
6	0.911709D-01	0.483467D-01	-0.281493	0.206952	0.151553	-0.224255	-0.163184	0.101601
7	0.153635D-01	0.147419	0.339273	-0.284550	-0.148397	0.103910	0.237819	-0.204071
8	0.744154	0.473456	0.331866	-0.445292	-0.385962	-0.126000	0.351958	0.204297
9	1.00000	0.625608	0.389378	-0.440928	-0.620266	0.693234D-01	0.635546	0.171829
10		1.00000	0.291576	-0.527357	-0.388698	0.168869	0.521720	-0.812169D-01
11			1.00000	-0.891365	-0.670028	0.580189D-01	0.587862	-0.277934
12				1.00000	0.805137	-0.949274D-01	-0.748560	0.216896
13					1.00000	-0.244428	-0.650499	0.312891D-01
14						1.00000	0.496900	-0.639298D-01
15							1.00000	-0.267609
16								1.00000

VARIABLE NUMBER	17	18	19	20	21	22
1	0.153407	-0.199161	0.267683	-0.511352D-01	-0.223997	-0.216835
2	0.336201D-01	-0.100656	-0.174702	0.310159	-0.436029D-01	-0.389262D-01
3	-0.291153	0.271391	-0.373599	0.469828	0.236136	0.233483
4	0.104711	-0.651369D-01	0.235944D-01	-0.182368	-0.458396D-01	-0.454543D-01
5	-0.250761D-01	-0.125062	0.967035	-0.140091	0.630736D-01	0.684525D-01
6	-0.105224	0.113391	-0.374105	0.189973	0.236057	0.197461
7	0.304225	-0.155685	0.548165D-01	-0.702076D-01	-0.280115	-0.272149
8	0.266128	-0.225623	-0.911794D-01	0.360256	-0.446530	-0.451740
9	0.444462	-0.479748	-0.438635D-01	0.507513	-0.646153	-0.661478
10	0.353828	-0.473480	0.122337	0.315471	-0.525185	-0.539777
11	0.500947	-0.372050	-0.134739D-01	0.200350	-0.888398	-0.869636
12	-0.478736	0.597069	0.422385D-01	-0.301373	0.999572	0.998435
13	-0.518987	0.550708	0.555354D-01	-0.341184	0.823445	0.828079
14	0.130061	-0.420671	0.213490	0.353708D-01	-0.133816	-0.106667
15	0.674358	-0.597858	0.613280D-01	0.384750	-0.750731	-0.756927
16	-0.390035	0.323342	-0.137068	0.209187D-01	0.299164	0.201107
17	1.00000	-0.683409	-0.186527D-01	0.131858	-0.638170	-0.642637
18		1.00000	-0.206564	-0.274215	0.514373	0.521274
19			1.00000	-0.174954	0.434157D-01	0.455329D-01
20				1.00000	-0.306464	-0.312347
21					1.00000	0.999226
22						1.00000

Occupation Stratum 6-9 Black Females

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	10.11627907	2.372554403
WAGE	2	1.721860465	0.4781225974
UNION	3	0.3953488372	0.4947117912
MIG<50	4	0.4418604651	0.5024855166
S. 16	5	0.6279069767	0.4890834876
EXP	6	28.37209302	12.09687731
TRAIN	7	0.2325581395	0.4274625744
PHY DM	8	2.162790698	0.6521113168
NEG WT	9	0.2325581395	0.6109013365
SVP	10	4.372093023	0.8247151258
%BMOCC	11	0.2511627907D-01	0.3197857118D-01
%WFOCC	12	0.6157441860	0.3513592039
%BFOCC	13	0.4020930233D-01	0.3433487616D-01
DA/PW	14	4.801214906	5.686813679
AVEMPF	15	0.1333108527	0.1353513931
EDSL	16	0.2840904454D-01	0.3100309167D-01
ATPFAS	17	0.3459767442D-01	0.1141368202D-01
%MININ	18	0.5865936475	0.2011410698
EDS16	19	6.232558140	5.277252213
UNXMPF	20	0.6325813953D-01	0.1258380268
%FMOCC	21	0.6559534884	0.3673662992
%MINOC	22	0.6810697674	0.3403461400

Occupation Stratum 6-9 Black Females

CORRELATION MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	0.246218	-0.400989D-01	-0.104038	-0.105457	-0.576446	0.183992	-0.104361
2		1.00000	0.503139	-0.106571	-0.363517	-0.158570	0.115494	0.257880
3			1.00000	-0.490037D-01	-0.263175	0.133975	-0.107353	0.909671D-01
4				1.00000	-0.283887	0.756073D-02	-0.157250	-0.224744
5					1.00000	0.148713	0.821037D-01	-0.104167
6						1.00000	-0.307214	0.162845D-01
7							1.00000	0.317821D-01
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	-0.150519	0.112430	0.221058	-0.295434	-0.356303	0.231202	0.155699	0.292465D-01
2	0.335958	0.442916	0.202690	-0.341877	-0.477512	0.463185	0.413100	-0.123738
3	0.161228	0.389500	-0.210351D-01	-0.714541D-01	-0.167588	0.191797	0.161367	0.348687
4	-0.187595	-0.614628D-01	0.401858	0.351555	0.386732D-01	0.109066D-01	0.265220D-0	0.202748
5	-0.101927	-0.250666	0.941720D-01	-0.432415D-01	0.685517D-01	0.104595D-02	-0.171836	-0.291625
6	0.685581D-01	-0.239933D-01	[illegible]	0.758934D-01	0.278693	-0.209287	-0.111561	-0.152559
7	0.614939D-01	-0.129736	0.344589	-0.281454	-0.199687	0.218812	0.262943	-0.137345
8	0.739437	0.424801	0.333603	-0.379415	-0.483473D-01	0.238865	0.160716	-0.185211
9	1.00000	0.589736	0.288649	-0.525943	-0.135186	0.512302	0.381512	-0.261505
10		1.00000	0.108822	-0.373842	-0.208568	0.484573	0.354446	-0.217022
11			1.00000	-0.866494	-0.306625	0.167727	0.478609	-0.280913
12				1.00000	0.427965	-0.416108	-0.634201	0.323473
13					1.00000	-0.313316	-0.388078	0.283973D-01
14						1.00000	0.560570	-0.141276
15							1.00000	-0.138079D-01
16								1.00000

VARIABLE NUMBER	17	18	19	20	21	22
1	0.357159	-0.251765	0.245001	0.149282	-0.315862	-0.320169
2	0.595577	-0.371767	-0.284964	0.471517	-0.371610	-0.382067
3	0.532314	-0.271119	-0.236694	0.629037	-0.840038D-01	-0.926493D-01
4	-0.130173	0.219395	-0.326996	-0.580648D-01	0.339852	0.329074
5	[illegible]	0.742634D-01	0.919912	-0.373065	-0.349503D-01	-0.288767D-01
6	-0.194633	0.194346D-01	-0.487545D-01	-0.621454D-01	0.986338D-01	0.100595
7	-0.589355D-01	-0.918302D-01	0.133774	-0.989192D-02	-0.287854	-0.278329
8	0.247968	-0.321029	-0.170392	0.154607	-0.367401	-0.365225
9	0.409845	-0.562535	-0.201809	0.340913	-0.515661	-0.529478
10	0.548194	-0.558578	-0.256141	0.537394	-0.377046	-0.396755
11	0.349061	-0.265848	0.143038	0.233327	-0.857397	-0.331507
12	-0.544180	0.558492	-0.117422	-0.422437	[illegible]	0.994118
13	-0.559519	0.672949D-01	-0.753065D-01	-0.260153	[illegible]	0.513385
14	0.533105	-0.597760	0.350859D-01	0.318964	-0.427232	-0.445391
15	0.626880	-0.434050	-0.171909	0.663343	-0.642838	-0.648903
16	0.146039	0.136249	-0.259152	0.295505	[illegible]	0.310410
17	1.00000	-0.599430	-0.115060	[illegible]	-0.572763	-0.585437
18		1.00000	0.434938D-01	-0.494802	0.540446	0.556494
19			1.00000	-0.358457	-0.119344	-0.115379
20				1.00000	-0.428345	-0.440428
21					1.00000	0.998830
22						1.00000

Occupation Stratum 6-9 Cross Race-Sex

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   VARIABLE                          MEAN              STANDARD DEVIATION

  SCHOOL      1               9.513002364             2.635736220
  WAGE        2               2.600780142            0.9992037619
  UNION       3              0.5200945626            0.5001876336
  MIG<50      4              0.4869976359            0.5004227752
  S 16        5              0.3191489362            0.4665988373
  EXP         6               29.96690307             11.51194894
  RACE        7              0.8983451537D-01        0.2862831281
  SEX         8              0.2671394799            0.4429897316
  TRAIN       9              0.1276595745            0.3341055222
  PHY DM     10               2.787234043            0.8215853704
  NEG WT     11              0.9030732861             1.181438200
  SVP        12               4.645626478             1.071595136
  %BMOCC     13              0.6733096927D-01        0.5115895043D-01
  %WFOCC     14              0.2216312057            0.3426666837
  %BFOCC     15              0.1351063830D-01        0.1852420615D-01
  DA/PW      16               23.95652908             64.48888744
  AVEMPF     17              0.3181222222            0.2657181447
  EDSI       18              0.2943937050D-01        0.3955394666D-01
  ATREAS     19              0.4162624113D-01        0.1552286028D-01
  %MININ     20              0.3558897720            0.2242827782
  EDS16      21               2.891252955             4.479282916
  UNXMPF     22              0.1900367218            0.2775906152
  %FMOCC     23              0.2351418440            0.3598220844
  %MINOC     24              0.3024728132            0.3281326003
  RAXSEX     25              0.1654846336D-01        0.1277230486
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Occupation Stratum 6-9 Cross Race-Sex

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CORRELATION MATRIX

VARIABLE      1            2             3              4              5              6              7              8
 NUMBER

    1      1.00000      0.156300    -0.231159D-01  0.544753D-01  -0.118003      -0.424602      -0.783253D-02  -0.182032D-01
    2                   1.00000      0.411393     -0.490057D-01  -0.152169      -0.872278D-01  -0.154327      -0.463284
    3                                1.00000       0.270809D-01  -0.255940       0.560844D-01  -0.291848D-01  -0.104493
    4                                              1.00000       -0.481416D-01  -0.296914D-01   0.743355D-01   0.317399D-01
    5                                                             1.00000       -0.633068D-01   0.210568      -0.580412D-01
    6                                                                            1.00000       -0.760312D-01   0.602863D-01
    7                                                                                           1.00000       -0.588827D-01
    8                                                                                                          1.00000
VARIABLE      9            10            11             12             13             14             15             16
 NUMBER

    1      0.179910     0.111292D-01 -0.344580D-01  0.650479D-01   0.533176D-01  -0.104683      -0.570667D-01   0.115070
    2      0.140264     0.261927      0.299321      0.221229       0.125875      -0.349601      -0.385502       0.177775
    3      0.271529D-01 0.102690      0.221948      0.194611      -0.753642D-01  -0.210959D-01  -0.583980D-01   0.363231D-01
    4      0.261265D-01 -0.674470D-02 -0.342056D-01 -0.552428D-01  -0.174913D-01   0.459618D-01   0.140107D-01  -0.696662D-01
    5     -0.443451D-01 0.103353      0.116405     -0.176018D-01  -0.114815D-01  -0.658231D-01  -0.808424D-01   0.172861D-01
    6     -0.236716    -0.405939D-01  0.738121D-01  0.207533D-01  -0.110649       0.118268       0.108879      -0.108289
    7      0.780139D-01 0.109323D-01 -0.302441D-01 -0.651455D-01   0.163001      -0.917672D-01  -0.886550D-01  -0.505627D-01
    8     -0.134899    -0.507573     -0.330740     -0.171999      -0.560188       0.808223       0.776593      -0.170187
    9      1.00000      0.560213D-01  0.194151D-01  0.796639D-01   0.556125D-01  -0.161241      -0.135377       0.809442D-01
   10                   1.00000       0.652506      0.237413       0.265253      -0.575252      -0.617055       0.140835
   11                                 1.00000       0.510369      -0.562346D-02  -0.410970      -0.462026       0.140630
   12                                               1.00000       -0.242591      -0.238545      -0.236240      -0.799001D-03
   13                                                              1.00000       -0.664956      -0.582745       0.186273
   14                                                                             1.00000        0.922260      -0.168414
   15                                                                                            1.00000       -0.193632
   16                                                                                                           1.00000
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Occupation Stratum 6-9 Cross Race-Sex (cont.)

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VARIABLE      17              18              19              20              21              22              23              24
 NUMBER

    1    0.451225D-01    0.177515D-01    0.134633       -0.601753D-01    0.733827D-01    0.370028D-01   -0.102630       -0.104696
    2    0.106563        0.130915D-01    0.211323       -0.450944       -0.127748        0.443244       -0.390876       -0.409000
    3    0.195670        0.113779        0.803356D-01   -0.130763       -0.251803        0.658390       -0.230966D-01   -0.370769D-01
    4   -0.155312D-02   -0.855815D-02    0.248908D-01    0.209114D-02   -0.323472D-01    0.422948D-01    0.444918D-01    0.460008D-01
    5   -0.127859D-01   -0.617440D-01   -0.117573       -0.115788        0.943889       -0.120586       -0.668467D-01   -0.750925D-01
    6   -0.550681D-01   -0.620658D-01   -0.168903D-01    0.786008D-01   -0.137337        0.101040D-01    0.118235        0.112402
    7   -0.126309D-01    0.210517D-01   -0.389791D-01   -0.109496D-01    0.218299       -0.194346D-01   -0.919561D-01   -0.756239D-01
    8   -0.134226       -0.107924D-01   -0.237042        0.736097       -0.139982D-01   -0.298437        0.809669        0.800526
    9    0.544985D-01    0.281191D-01    0.140721       -0.146773       -0.540383D-01    0.392792D-01   -0.160522       -0.167355
   10    0.263591        0.505791D-02    0.889399D-01   -0.550687        0.844894D-01    0.213184       -0.579593       -0.594212
   11    0.432866        0.872294D-01    0.243327       -0.460559        0.105024        0.410192       -0.415162       -0.456133
   12    0.158670       -0.545106D-02    0.325115       -0.190843        0.184138D-01    0.142576       -0.239334       -0.300269
   13    0.271244       -0.535167D-01    0.143817       -0.468792       -0.333073D-01    0.192044       -0.663254       -0.571401
   14   -0.434950        0.235352D-01   -0.317699        0.770420       -0.354376D-01   -0.307453        0.999802        0.992687
   15   -0.413155        0.216571D-01   -0.248577        0.771067       -0.443378D-01   -0.304053        0.929771        0.928710
   16    0.456313        0.159458       -0.843057D-01   -0.247921        0.224228D-01    0.286328       -0.170353       -0.157764
   17    1.00000         0.188105        0.466949       -0.474520       -0.332884D-01    0.713901       -0.435388       -0.435146
   18                    1.00000         0.507431D-01   -0.510765D-01   -0.598677D-01    0.180752        0.235281D-01    0.174567D-01
   19                                    1.00000        -0.268584       -0.952823D-01    0.303897       -0.315350       -0.323382
   20                                                    1.00000        -0.751917D-01   -0.395977        0.773384        0.774986
   21                                                                    1.00000        -0.115903       -0.360306D-01   -0.442354D-01
   22                                                                                    1.00000        -0.308448       -0.308295
   23                                                                                                    1.00000         0.993170
   24                                                                                                                    1.00000
VARIABLE      25
 NUMBER

    1    0.521525D-01
    2   -0.102792
    3   -0.237637D-01
    4   -0.151531D-01
    5    0.109958
    6   -0.544225D-01
    7    0.412836
    8    0.214854
    9    0.116969
   10   -0.124442
   11   -0.835695D-01
   12   -0.557332D-01
   13   -0.875149D-01
   14    0.120391
   15    0.104592
   16   -0.307871D-01
   17   -0.613106D-01
   18   -0.310696D-01
   19   -0.420521D-01
   20    0.121114
   21    0.139839
   22   -0.449135D-01
   23    0.120037
   24    0.117985
   25    1.00000
```

Occupation Stratum 12-14 White Males

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	10.80267062	2.349403260
WAGE	2	3.497462908	1.123903964
UNION	3	0.4406528190	0.4968341270
MIG<50	4	0.4124629080	0.4926432204
S.16.	5	0.2477744807	0.4320407734
EXP	6	23.40534451	11.60880533
TRAIN	7	0.3234421365	0.4681372372
PHY DM	8	2.664688427	0.7001883318
NEG WT	9	0.9287833828	0.9847134749
SVP	10	7.011869436	0.3419310700
%BMOCC	11	0.2667655786D-01	0.2021296311D-01
%WFOCC	12	0.4764985163D-01	0.7993806448D-01
%PFOCC	13	0.3501483680D-02	0.1603221583D-01
DA/PW	14	38.44435514	79.62230237
AVEMPF	15	0.4558345697	0.3158916796
FCSL	16	0.4833756677D-01	0.3795680471D-01
ATPFAS	17	0.4446632047D-01	0.1789191611D-01
%MININ	18	0.2812859636	0.1575312848
FDS16	19	2.537091988	4.605534737
UNXMPF	20	0.2430857072	0.3450933416
%FMOCC	21	0.5115133531D-01	0.9224995572D-01
%MINOC	22	0.7782789318D-01	0.9365000738D-01

Occupation Stratum 12-14 White Males

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CORRELATION MATRIX

VARIABLE        1            2            3              4              5              6              7             8
 NUMBER

    1       1.00000      0.312039    -0.552379D-01 -0.964673D-01 -0.137671      -0.433453       0.155369      -0.234189
    2                    1.00000      0.329791D-01 -0.161889      -0.134242      -0.469866D-01   0.702445D-01  -0.100175
    3                                 1.00000       0.333600D-01  -0.142523       0.481802D-02  -0.323407D-01   0.384488
    4                                               1.00000       -0.550207D-01   0.764890D-01  -0.147651       0.846082D-02
    5                                                              1.00000        0.988250D-02  -0.148022D-01   0.304539D-01
    6                                                                             1.00000       -0.310136       0.292442D-01
    7                                                                                            1.00000        0.485950D-01
    8                                                                                                           1.00000

VARIABLE        9             10            11             12             13             14             15            16
 NUMBER

    1     -0.523259D-01  0.136654     -0.300416      -0.250199D-01  -0.210945       0.493300D-01   0.918772D-01  -0.442513D-01
    2      0.824734D-01  0.140691     -0.271477      -0.557565D-01  -0.134216       0.979269D-01   0.230091       0.689631D-01
    3     -0.221251     -0.546630D-01  0.142149      -0.241126      -0.899629D-01   0.107471       0.269414       0.192712D-01
    4     -0.434996D-01 -0.432159D-01  0.471406D-01  -0.504308D-02   0.153491D-01  -0.117901D-02  -0.726071D-01  -0.102563D-01
    5      0.934346D-01 -0.289533D-01  0.767399D-01  -0.268693D-01   0.277271D-01   0.514869D-01  -0.212159D-01   0.497594D-02
    6      0.492620D-02  0.678173D-02  0.395743D-01   0.244271D-01   0.662494D-01  -0.348101D-02  -0.278584D-01   0.238662D-01
    7      0.307327D-01  0.131114D-01 -0.473786D-01  -0.731476D-01  -0.497567D-01   0.215485D-01   0.100701      -0.554645D-01
    8      0.246436D-01 -0.316512      0.336481      -0.463838       0.860358D-03   0.139035       0.255171       0.632090D-01
    9      1.00000       0.709161D-01 -0.379627D-01  -0.122333D-02   0.916795D-01   0.437555D-01  -0.107309D-01  -0.123002D-01
   10                    1.00000      -0.235846      -0.129658      -0.328329      -0.166703      -0.258292       0.344770D-02
   11                                  1.00000       -0.991254D-01   0.265441      -0.328434D-01  -0.167042      -0.178632D-01
   12                                                 1.00000        0.726807      -0.102239      -0.213741      -0.129626
   13                                                                1.00000       -0.527061D-01  -0.157416      -0.611632D-01
   14                                                                               1.00000        0.494986      -0.769895D-02
   15                                                                                              1.00000        0.334828D-01
   16                                                                                                             1.00000

VARIABLE        17            18            19             20             21             22
 NUMBER

    1      0.746551D-01 -0.234461D-03  0.218747D-01  -0.417508D-01  -0.566079D-01  -0.120601
    2      0.151922     -0.128139     -0.149713       0.592146D-01  -0.716407D-01  -0.129164
    3      0.230134     -0.918626D-01 -0.132721       0.[illegible]  -0.224569      -0.190520
    4     -0.139962D-01  0.565762D-02 -0.734135D-01  [illegible]    -0.170249D-02   0.344757D-02
    5     -0.137388      0.620146D-02  0.759934      -0.671491D-01  -0.184645D-01  -0.167535D-02
    6      0.485539D-01 -0.238748D-01 -0.441384D-01  -0.236943D-01   0.326606D-01   0.407551D-01
    7     -0.174439D-01  0.539117D-01  0.632633D-02   0.397026D-01  -0.694324D-01  -0.785453D-01
    8     -0.256988D-01 -0.251553D-01 -0.592410D-02   0.446653      -0.401784      -0.323153
    9     -0.217164     -0.651235D-02  0.611296D-01  -0.124462       0.145730D-01   0.645697D-02
   10      0.206436     -0.124636     -0.939601D-03  -0.235568      -0.169414      -0.217765
   11     -0.194172     -0.716950D-01  0.177556D-01   0.375133D-01  -0.397647D-01   0.176665
   12     -0.167221      0.376689     -0.344573D-01  -0.249969       0.942650       0.956612
   13     -0.184529      0.277572     -0.155566D-01  -0.103944       0.833596       0.848674
   14     -0.184723     -0.173553      0.533575D-01   0.363182      -0.977540D-01  -0.103361
   15      0.216352     -0.555777D-01 -0.543363D-03   0.617329      -0.212577      -0.245453
   16     -0.145279     -0.245931      0.431277D-02   0.163595D-01  -0.122956      -0.124973
   17      1.00000       0.205453D-01 -0.113528       0.189286      -0.176973      -0.216236
   18                    1.00000      -0.104206D-02  -0.554695D-01   0.374647       0.349212
   19                                  1.00000       -0.603324D-01  -0.324824D-01  -0.281647D-01
   20                                                 1.00000       -0.234151      -0.222554
   21                                                                1.00000        0.976468
   22                                                                               1.00000
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Occupation Stratum 12-14 Black Males

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  VARIABLE                   MEAN              STANDARD DEVIATION

SCHOOL     1            9.187500000           3.262166808
WAGE       2            2.588046875          0.9999307524
UNION      3           0.3671875000          0.4839322812
MIG<50     4           0.3593750000          0.4817026070
S. 16      5           0.6406250000          0.4817026070
EXP        6            28.01562500           12.57480569
TRAIN      7           0.1796875000          0.3854355089
PHY DM     8            2.890625000          0.6668101880
NEG WT     9            1.132812500          0.9338017607
SVP       10            6.788281250          0.5215997642
%BMOCC    11           0.4792187500D-01      0.4322229837D-01
%WFOCC    12           0.9708593750D-01      0.1729455801
%BFOCC    13           0.2215625000D-01      0.5031623421D-01
DA/PW     14            17.25026181           32.05703116
AVEMPF    15           0.3624205729          0.3017795463
FDSL      16           0.6339899184D-01      0.1348131672
ACPFAS    17           0.3612265625D-01      0.2092413072D-01
%MININ    18           0.3455087623          0.1842227408
EDS16     19            5.492187500           4.962847947
UNXMPF    20           0.1947591146          0.3168350711
%FMOCC    21           0.1192421875          0.2215018084
%MINOC    22           0.1671640625          0.2345855376
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Occupation Stratum 12-14 Black Males

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CORRELATION MATRIX

VARIABLE       1              2              3              4              5              6              7              8
 NUMBER

    1      1.00000        0.330818       0.657761D-01  -0.188533      -0.252421      -0.621415       0.286112      -0.954730D-01
    2                     1.00000        0.395277      -0.253223      -0.200089      -0.219274       0.322695      -0.475601D-01
    3                                    1.00000       -0.638613D-01  -0.712503D-01  -0.734102D-01   0.234158D-01   0.343141D-02
    4                                                   1.00000       -0.837752D-01   0.146647D-01  -0.180904      -0.727761D-01
    5                                                                  1.00000        0.225820      -0.158374       0.146318
    6                                                                                 1.00000       -0.265392       0.104441
    7                                                                                                1.00000        0.464338D-01
    8                                                                                                               1.00000
VARIABLE       9             10             11             12             13             14             15             16
 NUMBER

    1     -0.189179       0.721033D-01  -0.126942       0.749384D-02  -0.596644D-01   0.[illegible]08876D-01   0.2[illegible]167       0.512451D-01
    2     -0.105299       0.108140      -0.130760      -0.203510      -0.255547       0.141489       0.500351       0.159135
    3     -0.12[illegible]191      -0.764015D-01   0.917295D-01  -0.186566      -0.176996       0.3[illegible]1805D-01   0.425693      -0.522314D-01
    4     -0.369247D-01  -0.439176D-01   0.514101D-02   0.599279D-01   0.636135D-01   0.713520D-01  -0.299871D-01   0.119079D-01
    5     -0.330954D-01  -0.482321D-01   0.338125D-01  -0.755231D-01  -0.642633D-01   0.449564D-01  -0.241899D-01   0.273539D-01
    6      0.103089      -0.345328D-02   0.227183D-01  -0.502913D-01  -0.605449D-02   0.624928D-01  -0.137441      -0.372526D-02
    7     -0.198090       0.131970      -0.139054      -0.201988      -0.195126      -0.545282D-01   0.199963       0.132066
    8      0.235129D-01  -0.325188       0.137942      -0.803500D-01   0.589500D-01   0.173120       0.796450D-01   0.291808
    9      1.00000       -0.169756       0.753685D-01   0.339030       0.36941[illegible]      -0.623335D-01  -0.254942       0.375965D-01
   10                     1.00000       -0.681625      -0.520219      -0.605[illegible]      -0.444545D-02   0.14[illegible]79D-01   0.101941D-01
   11                                    1.00000        0.195638       0.26[illegible]986      -0.128173      -0.135897      -0.107903
   12                                                   1.00000        0.955022      -0.178870      -0.345307      -0.196933
   13                                                                  1.00000       -0.181318      -0.349505      -0.167377
   14                                                                                 1.00000        0.545967      -0.908541D-01
   15                                                                                                1.00000        0.120956
   16                                                                                                               1.00000
VARIABLE      17             18             19             20             21             22
 NUMBER

    1      0.216900       0.455219D-01   0.257863       0.137372      -0.770224D-02  -0.306517D-01
    2      0.378133      -0.318145      -0.246366D-01   0.432375      -0.2169[illegible]      -0.228340
    3      0.423050      -0.172243      -0.168281D-01   0.810142      -0.185[illegible]75      -0.158607
    4     -0.554991D-01   0.110651      -0.163502      -0.340897D-01   0.6124[illegible]3D-01   0.587729D-01
    5     -0.126289      -0.132899       0.832127      -0.695659D-01  -0.735655D-01   0.632325D-01
    6     -0.231511      -0.393759D-01  -0.119609      -0.107912      -0.406444D-01  -0.341317D-01
    7      0.249920      -0.164041      -0.342494D-01   0.140023      -0.202034      -0.216386
    8     -0.239161       0.106264D-01   0.123467       0.855857D-01  -0.493452D-01  -0.21[illegible]72D-01
    9     -0.274914       0.766284D-01  -0.129753      -0.169748       0.348626       0.343068
   10      0.163045      -0.304380      -0.366891D-01  -0.323585D-01  -0.543628      -0.638897
   11     -0.255523D-01   0.412986D-01  -0.285248D-01   0.406927D-01   0.214082       0.386391
   12     -0.277339       0.625842      -0.253697D-01  -0.261592       0.997729       0.978128
   13     -0.291132       0.639370      -0.481766D-01  -0.245338       0.972828       0.968315
   14      0.898268D-01  -0.[illegible]92318       0.111306       0.162705      -0.180983      -0.194505
   15      0.505624      -0.312704       0.957959D-01   0.705686      -0.349004      -0.354578
   16     -0.209103      -0.356389       0.954738D-02  -0.257604D-01  -0.191784      -0.200968
   17      1.00000       -0.338457      -0.169719D-01   0.505677      -0.282676      -0.271618
   18                     1.00000       -0.599141D-01  -0.231132       0.627073       0.599708
   19                                    1.00000        0.773132D-02  -0.307521D-01  -0.342926D-01
   20                                                   1.00000       -0.259979      -0.237981
   21                                                                  1.00000        0.983671
                                                                                      1.00000
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Occupation Stratum 12-14 White Females

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  VARIABLE                    MEAN              STANDARD DEVIATION

SCHOOL     1             11.42608696             1.937899340
WAGE       2              2.[illegible]54956522         0.9197505134
UNION      3            0.1043478261            0.3070491430
MIG<50     4            0.5217391304            0.5017133117
S. 16      5            0.2000000000            0.4017505554
EXP        6             26.19130435             10.74006734
TRAIN      7            0.2086956522            0.4081548591
PHY DM     8             1.434782609            0.7738034760
NEG WT     9            0.4173913043            0.7721308940
SVP       10             6.275652174            0.4610421651
%BMOCC    11            0.1398260870D-01        0.2510503640D-01
%WFOCC    12            0.7033391304            0.3396325385
%BFOCC    13            0.2870434783D-01        0.4367724003D-01
CA/PW     14             12.60935380             25.23131698
AVEMPF    15            0.2964168116            0.2595031891
FCSL      16            0.2766618456D-01        0.5703576829D-01
AIPFAS    17            0.3676869565D-01        0.1897608544D-01
%MININ    18            0.4347694462            0.2133400297
EDS16     19             2.200000000             4.569540650
UNXMPF    20            0.5141391304D-01        0.1807303733
%FMOCC    21            0.7320434783            0.3370630216
%MINOC    22            0.7460260870            0.3292592867
```

Occupation Stratum 12-14 White Females

CORRELATION MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	0.242663	-0.166649D-02	0.490332D-01	-0.110416	-0.383687	0.751240D-01	-0.487302
2		1.00000	0.778149D-02	-0.339773D-01	-0.220633	0.357788D-01	0.271279D-01	-0.403458
3			1.00000	-0.148544D-01	-0.995540D-01	0.110933	-0.105296	0.658127D-01
4				1.00000	-0.870308D-01	-0.398486D-01	0.633236D-01	-0.245594D-01
5					1.00000	-0.252089D-01	-0.962911D-01	0.846499D-01
6						1.00000	-0.131253	0.317106
7							1.00000	-0.953973D-01
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	-0.477503	-0.355460	-0.504695	0.477536	-0.355854	0.911330D-01	0.968123D-01	0.274081
2	-0.452068	-0.207071	-0.443198	0.318698	-0.445755	0.229861	0.401340	0.161849
3	0.110677	0.151667	0.252726D-01	-0.203650	-0.702625D-01	0.105932	0.259326	0.180625D-01
4	0.443030D-01	-0.773293D-01	-0.417556D-01	0.124407	0.419270D-01	0.444826D-01	-0.276646D-01	-0.643762D-01
5	0.205257	0.454642D-01	0.116890	-0.105605	0.663468D-01	-0.692396D-01	-0.132018	-0.726719D-01
6	0.242039	0.253569	0.275992	-0.282839	0.189267	-0.227020	-0.185734	-0.537819D-01
7	-0.135655	-0.112617	-0.193115	0.233428	-0.126411	0.973735D-01	0.490062D-01	0.475479D-01
8	0.866124	0.251224	0.895806	-0.509471	0.785056	-0.199361	-0.217771	-0.378592D-03
9	1.00000	0.285608	0.818092	-0.565079	0.715079	-0.211550	-0.349416	-0.848286D-01
10		1.00000	0.475572D-01	-0.850677	-0.228273	-0.210308	-0.982730D-02	-0.661231D-01
11			1.00000	-0.431086	0.904065	-0.195804	-0.306211	-0.211162D-01
12				1.00000	-0.122908	0.261566	0.843920D-01	0.376911D-01
13					1.00000	-0.137366	-0.329888	-0.592527D-01
14						1.00000	0.527838	-0.752612D-04
15							1.00000	0.613551D-01
16								1.00000

VARIABLE NUMBER	17	18	19	20	21	22
1	0.153248	-0.460388	0.457650D-01	0.418952D-01	0.435067	0.406023
2	0.443760	-0.395715	-0.172219	0.264068D-01	0.263366	0.235315
3	0.139975	-0.129315D-02	-0.775240D-01	0.637094	-0.214310	-0.217001
4	0.321557D-01	0.116764	-0.803501D-01	0.120021D-01	0.130788	0.130427
5	-0.777589D-01	0.150339	0.967112	-0.367129D-01	-0.980091D-01	-0.912256D-01
6	-0.714651D-01	0.177167	-0.740698D-01	0.864069D-02	-0.260467	-0.245076
7	0.913429D-01	-0.168635	-0.884210D-01	-0.467696D-01	0.218827	0.208845
8	-0.394953	0.360169	0.146547D-01	-0.342652D-02	-0.411626	-0.352330
9	-0.357473	0.512389	0.125303	-0.736305D-02	-0.476725	-0.424744
10	-0.103300	0.475378	0.108257D-02	0.866839D-01	-0.886137	-0.901597
11	-0.377504	0.405863	0.360455D-01	-0.924333D-01	-0.317220	-0.247964
12	0.171091	-0.552238	-0.356752D-01	-0.786345D-01	0.991697	0.980246
13	-0.370766	0.301468	0.155301D-01	-0.120707	0.573702D-02	0.746480D-01
14	0.145651	-0.293267	-0.548946D-01	0.265977	0.245760	0.236153
15	0.384516	-0.155019	-0.887262D-01	0.425509	0.422879D-01	0.199001D-01
16	0.686410D-01	-0.215445	-0.693343D-01	0.800991D-01	0.303004D-01	0.293461D-01
17	1.00000	-0.381618	-0.470867D-01	0.209609	0.130393	0.104478
18		1.00000	0.977642D-01	-0.151638	-0.517360	-0.497659
19			1.00000	-0.750794D-02	-0.339607D-01	-0.319493D-01
20				1.00000	-0.948753D-01	-0.103951
21					1.00000	0.997393
22						1.00000
23						
24						

Occupation Stratum 12-14 Cross Race-Sex

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  VARIABLE                     MEAN                STANDARD DEVIATION

SCHOOL      1           10.34268293              2.349942482
WAGE        2            3.293975610             1.175864652
UNION       3           0.3841463415            0.4866896257
MIG<50      4           0.4256097561            0.4947368846
S 16        5           0.2548780488            0.4360586150
EXP         6            28.09512195             11.46404798
RACE        7           0.3780487805D-01        0.1908404674
SEX         8           0.1487804878            0.3560891571
TRAIN       9           0.3024390244            0.4595946639
PHY DM     10            2.503658537            0.8970097008
NEG WP     11           0.8731707317            0.9726477565
SVP        12            6.896097561            0.4544012312
%BHOCC     13           0.2573658537D-01        0.2304179730D-01
%WFOCC     14           0.1440500000            0.2730532581
%BFOCC     15           0.8531707317D-02        0.2758213786D-01
DA/PW      16            33.82438862             73.55092587
AVEMPF     17           0.4275130488            0.3133135309
FDSL       18           0.4548180202D-01        0.8626611417D-01
ATPFAS     19           0.4302792683D-01        0.1833778735D-01
%MININ     20           0.3079598231            0.1768430866
EDS16      21            2.601219512             4.649444776
UNXAPP     22           0.2122865041            0.3323468487
%FHOCC     23           0.1525817073            0.2852737295
%MINOC     24           0.1783182927            0.2818013873
RAXSEX     25           0.3536585366D-02        0.9205458315D-01
```

Occupation Stratum 12-14 Cross Race-Sex

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CORRELATION MATRIX

VARIABLE       1               2               3               4               5               6               7               8
 NUMBER

    1     1.00000         0.280911       -0.527874D-01   -0.757178D-01   -0.158621       -0.436541       -0.109240        0.746978D-01
    2                     1.00000         0.130847       -0.161544       -0.203698       -0.195338D-01   -0.158681       -0.355281
    3                                     1.00000         0.960178D-02   -0.113975        0.216731D-01   -0.776736D-01   -0.245644
    4                                                     1.00000        -0.506685D-01    0.514394D-01   -0.283719D-01    0.767628D-01
    5                                                                     1.00000         0.129744D-01    0.162846       -0.164749D-01
    6                                                                                     1.00000         0.560953D-02   -0.600013D-01
    7                                                                                                     1.00000         0.429028D-01
    8                                                                                                                     1.00000

VARIABLE       9               10              11              12              13              14              15              16
 NUMBER

    1     0.153769       -0.278053       -0.125155        0.171479D-01   -0.353896        0.129791       -0.192813        0.450460D-01
    2     0.193713        0.326655D-01    0.536493D-01    0.279163       -0.228156       -0.264241       -0.325383        0.144794
    3    -0.692323D-02    0.345326       -0.160045        0.102854        0.122378       -0.238057       -0.171316        0.138935
    4    -0.131838       -0.410561D-01   -0.475419D-01   -0.849346D-01    0.115604D-01    0.922696D-01    0.570360D-01   -0.927510D-02
    5    -0.378330D-01    0.673436D-01    0.119492       -0.209551D-01    0.131615       -0.454125D-01    0.765317D-01    0.364830D-01
    6    -0.284481        0.986354D-01    0.543013D-01    0.660286D-01    0.102956       -0.942153D-01    0.628317D-01   -0.646080D-02
    7    -0.469319D-01    0.102614        0.982199D-01   -0.940414D-01    0.199413        0.153581D-01    0.248320       -0.586408D-01
    8    -0.962255D-01   -0.456597       -0.156972       -0.585751       -0.147751        0.837336        0.407154       -0.124227
    9     1.00000         0.624706D-01    0.148961D-01    0.594468D-01   -0.700640D-01   -0.616502D-01   -0.111910        0.389960D-01
   10                     1.00000         0.197858        0.101585        0.446357       -0.570505        0.263238D-01    0.155639
   11                                     1.00000         0.155519        0.136344       -0.216514        0.173918        0.789190D-01
   12                                                     1.00000        -0.973682D-01   -0.667243       -0.455556       -0.479493D-01
   13                                                                     1.00000        -0.237318        0.387490       -0.295161D-01
   14                                                                                     1.00000         0.402465       -0.115654
   15                                                                                                     1.00000        -0.979577D-01
   16                                                                                                                     1.00000
```

Occupation Stratum 12-14 Cross Race-Sex (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.351730D-01	-0.410054D-02	0.100901	-0.438448D-01	0.140314D-01	-0.386319D-01	0.105588	0.779526D-01
2	0.107170	0.139817	0.255197	-0.275238	-0.154206	0.135851	-0.284381	-0.306541
3	0.315553	0.344608D-01	0.233193	-0.151677	-0.119456	0.909257	-0.292281	-0.285876
4	-0.804425D-01	-0.177683D-01	-0.303281D-01	0.529696D-01	-0.689130D-01	-0.449904D-01	0.938316D-01	0.959330D-01
5	-0.436745D-01	-0.304243D-02	-0.142332	0.452613D-01	0.957168	-0.645980D-01	-0.360676D-01	-0.257504D-01
6	-0.381039D-01	0.222611D-01	0.256381D-01	-0.142004D-01	-0.493174D-01	-0.120158D-01	-0.8410[illegible]D-01	-0.767224D-01
7	-0.519401D-01	0.413728D-02	-0.871079D-01	0.122736	0.122970	-0.434749D-01	0.3870[illegible]D-01	0.554916D-01
8	-0.193355	-0.915752D-01	-0.165522	0.327260	-0.763212D-02	-0.206205	0.841311	0.839597
9	0.115238	-0.273653D-01	0.230894D-01	-0.239592D-01	-0.126293D-01	0.565891D-01	-0.698390D-01	-0.764284D-01
10	0.247697	0.133142	-0.167742D-01	-0.128713	0.245033D-01	0.431289	-0.543521	-0.513721
11	-0.327453D-01	-0.168351D-02	-0.218262	0.277375D-01	0.914013D-01	-0.907140D-01	-0.190424	-0.181622
12	-0.497230D-01	0.441710D-01	0.221464	-0.197162	-0.767266D-02	-0.290075D-01	-0.682706	-0.699080
13	-0.167768	-0.120213D-01	-0.207892	-0.764035D-02	0.533483D-01	0.345192D-01	-0.190166	-0.110743
14	-0.201246	-0.106259	-0.145542	0.239182	-0.283683D-01	-0.244220	0.996075	0.988903
15	-0.254644	-0.885473D-01	-0.292066	0.393427	0.316183D-01	-0.162506	0.481911	0.519533
16	0.497875	0.103168D-02	-0.127386	-0.197556	0.491460D-01	0.317526	-0.120171	-0.124065
17	1.00000	0.549722D-01	0.271925	-0.135079	-0.152792D-01	0.621432	-0.217246	-0.233641
18		1.00000	-0.116048	-0.252963	-0.193251D-02	0.318958D-01	-0.110269	-0.112610
19			1.00000	-0.117517	-0.113549	0.222732	-0.167594	-0.186658
20				1.00000	0.307282D-01	-0.124146	0.267741	0.270415
21					1.00000	-0.527759D-01	-0.240964D-01	-0.200312D-01
22						1.00000	-0.249470	-0.249722
23							1.00000	0.996773
24								1.00000

VARIABLE NUMBER	25
1	-0.[illegible]7342D-01
2	-0.156235
3	-0.732347D-01
4	0.555817D-03
5	0.128236
6	0.212126D-01
7	0.468125
8	0.221348
9	-0.613936D-01
10	0.313750D-01
11	0.197555
12	-0.183938
13	0.236567
14	-0.116914
15	0.459330
16	-0.405641D-01
17	-0.103709
18	-0.392211D-01
19	-0.119632
20	0.172132
21	0.132135
22	-0.593061D-01
23	0.156035
24	0.174548
25	1.00000

Occupational Stratum 15-17 White Males

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  VARIABLE                      MEAN                STANDARD DEVIATION

SCHOOL    .1               14.21254355              2.658956919
WAGE       2               4.831254355              2.038005974
UNION      3              0.1114982578             0.3152979263
MIG<50     4              0.2682926829             0.4438447069
S. 16      5              0.1846689895             0.3887065855
EXP        6               22.43902439              10.60325239
TRAIN      7              0.4494773519             0.4983098062
PHY DM     8               1.536585366             0.4995307366
NEG WT     9              0.1393728223D-01         0.1666646362
SVP       10               7.477700348             0.4333851233
%BMOCC    11              0.9317073171D-02         0.7504345208D-02
%WFOCC    12              0.9674554460D-01         0.1127932453
%BFOCC    13              0.2871080139D-02         0.8455608054D-02
DA/PW     14               50.22205967              108.2667440
AVEMPF    15              0.5547205575             0.2794237727
FDSL      16              0.4519848807D-01         0.7317900541D-01
ATPFAS    17              0.4724912892D-01         0.1852925463D-01
%MININ    18              0.2821773328             0.1419488676
EDS16     19               2.686411150              5.743277312
UNXMPF    20              0.6491254355D-01         0.2064812091
%FMOCC    21              0.9961672474D-01         0.1184538186
%MINOC    22              0.1089337979             0.1210181421
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Occupational Stratum 15-17 White Males

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CORRELATION MATRIX

VARIABLE    1              2              3              4              5              6              7              8
 NUMBER

   1     1.00000        0.433729      -0.224386      -0.633012D-01   0.599980D-01  -0.290918      -0.855482D-01  -0.203533D-01
   2                    1.00000       -0.163786      -0.137325      -0.470717D-02   0.449899D-01  -0.796069D-01  -0.136739
   3                                   1.00000        0.110300      -0.830033D-01   0.668641D-01   0.137248D-01   0.107209
   4                                                  1.00000       -0.105782      -0.526050D-01  -0.254486D-01   0.265403D-01
   5                                                                 1.00000        0.910420D-02  -0.328952D-01   0.461164D-01
   6                                                                                1.00000       -0.189681      -0.796187D-01
   7                                                                                               1.00000        0.531031D-01
   8                                                                                                              1.00000

VARIABLE    9             10             11             12             13             14             15             16
 NUMBER

   1     0.564124D-01   0.357008      -0.115362      -0.220490      -0.451211D-01   0.277945D-01   0.864147D-01  -0.436977D-01
   2     0.405068D-01   0.289109      -0.205257      -0.215080      -0.104085       0.169845D-01   0.117782       0.[illegible]93227D-02
   3    -0.296755D-01  -0.508286D-01   0.120959       0.625435D-01   0.159025D-01   0.476255D-01   0.343787D-01  -0.290047D-01
   4    -0.537257D-01   0.184876D-01   0.489035D-01  -0.188864D-01  -0.513095D-01   0.410646D-02   0.424994D-01   0.590518D-02
   5     0.580762D-01  -0.232074D-01   0.505780D-01   0.150313D-01  -0.257095D-01   0.202[illegible]   0.370566D-01  -0.262860D-01
   6    -0.588745D-01  -0.187104D-01  -0.133563D-01   0.114797      -0.200358D-01   0.345[illegible]21D-0[illegible]   0.[illegible]35300D-01  -0.260115D-01
   7    -0.756936D-01  -0.129902       0.702179D-01  -0.108877      -0.509262D-01  -0.6790[illegible]3D-02   0.125160       0.516885D-01
   8     0.778499D-01  -0.228792       0.438545      -0.125096       0.114943      -0.648786D-01   0.258750D-01  -0.159779D-01
   9     1.00000        0.101134      -0.706405D-01  -0.704899D-01  -0.284918D-01  -0.206557D-01  -0.336923D-01  -0.516308D-01
  10                    1.00000       -0.391196      -0.186984      -0.152783       0.159791       0.744108D-01   0.274226D-01
  11                                   1.00000        0.303501       0.346529      -0.674037D-01  -0.817500D-01  -0.683939D-01
  12                                                  1.00000        0.648761      -0.556801D-02  -0.119512      -0.562482D-01
  13                                                                 1.00000       -0.290953D-01  -0.149549D-01  -0.571163D-01
  14                                                                                1.00000        0.445996       0.662676D-01
  15                                                                                               1.00000       -0.276651D-01
                                                                                                                  1.00000
VARIABLE   17             18             19             20             21             22
 NUMBER

   1     0.853113D-01   0.196875D-01   0.125272      -0.173357      -0.213174      -0.215810
   2     0.160617      -0.750725D-01   0.192446D-01  -0.133110      -0.212232      -0.220463
   3     0.350232D-01  -0.425247D-01  -0.984071D-01   0.888999       0.606899D-01   0.669046D-01
   4    -0.100839       0.343460D-01  -0.999297D-01   0.105283      -0.216465D-01  -0.181554D-01
   5    -0.839866D-01   0.296922D-02   0.984556      -0.365025D-01   0.124778D-01   0.153497D-01
   6    -0.129963       0.472772D-01  -0.170232D-01   0.585042D-01   0.107881       0.104766
   7     0.264179D-01  -0.119888      -0.385419D-01   0.342729D-01  -0.107309      -0.100681
   8    -0.942755D-01   0.114386       0.333555D-01   0.153858      -0.110913      -0.813683D-01
   9    -0.264901D-01  -0.988800D-01   0.776388D-01  -0.263814D-01  -0.691553D-01  -0.720704D-01
  10    -0.136847D-01  -0.104980       0.185330D-01  -0.621336D-01  -0.188954      -0.209209
  11    -0.647091D-01   0.209534       0.501796D-01   0.794269D-01   0.313734       0.369097
  12    -0.388418D-01   0.131022      -0.620127D-03  -0.420090D-01   0.998523       0.996185
  13     0.720434D-01   0.109916      -0.312192D-01  -0.112131D-01   0.689142       0.696028
  14    -0.232797      -0.267388       0.197531       0.130150      -0.737885D-02  -0.114022D-01
  15    -0.184452D-01  -0.226171       0.784910D-01   0.185952      -0.114868      -0.117504
  16    -0.140008      -0.240545      -0.355561D-01  -0.251086D-01  -0.592087D-01  -0.612164D-01
  17     1.00000       -0.175142      -0.821856D-01   0.860096D-02  -0.318433D-01  -0.351809D-01
  18                    1.00000       -0.277516D-02  -0.937642D-01   0.132607       0.142790
  19                                   1.00000       -0.570507D-01  -0.281902D-02   0.352356D-03
  20                                                  1.00000       -0.408020D-01  -0.350121D-01
  21                                                                 1.00000        0.998265
  22                                                                                1.00000
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Occupation Stratum 15-17 White Females

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 VARIABLE                     MEAN                  STANDARD DEVIATION

SCHOOL      1          12.96666667              2.281610643
WAGE        2           2.831000000             1.063703193
UNION       3          0.1000000000            0.3051285766
MIGRSO      4          0.3333333333            0.4794633015
S. 16       5          0.1666666667            0.3790490218
EXP         6          25.73333333              9.818818432
TRAIN       7          0.2000000000            0.4068381022
PHY DM      8           1.466666667            0.5074162634
NEG WT      9          0.0                     0.0
SVP        10           7.513333333            0.4256705326
TRMICC     11          0.9033333333D-02        0.8231492651D-02
XMEDOC     12          0.3243666667            0.2454937998
THEDOC     13          0.1096666667D-01        0.1710108553D-01
DAYPW      14          24.22796968              32.88062392
AVEHRE     15          0.4112411111            0.2808003130
EOSI       16          0.2840613454D-01        0.4119164273D-01
ATREAS     17          0.4884333333D-01        0.1832384321D-01
XMININ     18          0.3014732836            0.1359390693
EOS16      19           2.200000000             5.067815962
UNXHRE     20          0.7984444444D-01        0.2499296122
XEMDOC     21          0.3353333333            0.2611869899
XMINOC     22          0.3443666667            0.2597110441
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Occupation Stratum 15-17 White Females

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CORRELATION MATRIX

VARIABLE      1            2            3            4            5            6            7            8
 NUMBER

    1     1.00000      0.561950    -0.143640    -0.241664     0.465170D-01 -0.323647     0.230319     0.138996D-01
    2                  1.00000      0.177425D-01 -0.263688   -0.346371D-01 -0.158549     0.209085     0.267434
    3                               1.00000      0.294392D-16 -0.149071     0.101284    -0.166667     0.133631
    4                                            1.00000     -0.126491    -0.683635D-01 -0.176777     0.472456D-01
    5                                                         1.00000     -0.228538    -0.223607     0.119523
    6                                                                      1.00000     -0.201993    -0.156879D-01
    7                                                                                   1.00000     -0.133631
    8                                                                                                1.00000
VARIABLE      9           10           11           12           13           14           15           16
 NUMBER

    1     0.0          0.217763D-01  0.156125     0.926749D-01  0.874633D-01  0.969272D-01 -0.152207     0.340946
    2     0.0         -0.107440      0.245109     0.605768D-01  0.160052     0.172699     0.235839     0.632035
    3     0.0         -0.169913      0.398142D-01 -0.128941   -0.111682     0.158248     0.467503     0.360855D-01
    4     0.0          0.619505D-01  0.931959D-01  0.241202D-01  0.350463D-01  0.112140     0.109848D-02 -0.140873
    5     0.0         -0.121105      0.418122     0.121978     0.181755     0.231790     0.626006D-01  0.132916D-01
    6     0.0         -0.115449     -0.365092     0.187987     0.264359D-01 -0.275999     0.651969D-01 -0.932176D-01
    7     0.0          0.382303     -0.535433D-01 -0.208258   -0.226998    -0.365686D-01 -0.143994     0.878351D-01
    8     0.0         -0.748218      0.541030     0.351247     0.554223     0.364683     0.447530     0.219369
    9     0.0          0.0          0.0          0.0          0.0          0.0          0.0          0.0
   10                  1.00000     -0.412479    -0.495316    -0.602485    -0.441439    -0.552072    -0.137437D-02
   11                               1.00000     -0.211669     0.671279D-01  0.625026     0.287053     0.156221
   12                                            1.00000      0.912173     0.128661     0.310940     0.648813D-01
   13                                                         1.00000      0.294742     0.441674     0.193318
   14                                                                      1.00000      0.654951    -0.915175D-01
   15                                                                                   1.00000      0.161064
   16                                                                                                1.00000
VARIABLE     17           18           19           20           21           22
 NUMBER

    1     0.187585D-01  0.397452D-01  0.131932    -0.140019     0.929332D-01  0.983092D-01
    2     0.237727    -0.910125D-01 -0.36[illegible]91D-01  0.470610D-01  0.674164D-01  0.752513D-01
    3     0.209551     0.133060    -0.14[illegible]   0.974787    -0.128506    -0.127975
    4    -0.224329D-02  0.614394D-02 -0.351445D-01 -0.692860D-01  0.249656D-01  0.280613D-01
    5    -0.260728    -0.163721     0.987298    -0.145313     0.126949     0.140521
    6     0.314688     0.922714D-01 -0.262224     0.648947D-01  0.178329     0.167771
    7    -0.590473D-01 -0.161002    -0.220757    -0.162465    -0.210607    -0.213501
    8     0.288951     0.102538     0.136778     0.108458     0.366430     0.385661
    9     0.0          0.0          0.0          0.0          0.0          0.0
   10    -0.446667     0.526700D-02 -0.141945    -0.194253    -0.505002    -0.520946
   11    -0.512940D-01 -0.837116D-01  0.447353     0.347782D-01 -0.194556    -0.163967
   12     0.228755    -0.125667     0.150380    -0.148108     0.999640     0.998612
   13     0.240305    -0.125142     0.217723    -0.115988     0.922841     0.930213
   14     0.449976D-01 -0.213922     0.311175     0.193743     0.140229     0.160836
   15     0.313939     0.530745D-01  0.387163D-01  0.500029     0.321176     0.332099
   16     0.276787    -0.143516     0.219290D-01  0.604668D-01  0.736404D-01  0.790103D-01
   17     1.00000     -0.350757    -0.236395     0.254634     0.324736     0.325272
   18                  1.00000     -0.156239     0.170177    -0.127250    -0.130627
   19                               1.00000     -0.143467     0.155318     0.170395
   20                                            1.00000     -0.146804    -0.146536
   21                                                         1.00000      0.999517
   22                                                                      1.00000
```

Occupation Stratum 15-17 Cross Race-Sex

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   VARIABLE                          MEAN              STANDARD DEVIATION

SCHOOL     1                    14.09006211             2.639496435
WAGE       2                    4.628322981             2.043987532
UNION      3                   0.1149068323            0.3194058308
MIG<50     4                   0.276397515[illegible]            0.4479118082
S 16       5                   0.1801242236            0.3848890079
EXP        6                    22.71118012             10.51451152
RACE       7                   0.1552795031D-01        0.1238323690
SEX        8                   0.5937888199D-01        0.2996356863
TRAIN      9                   0.4254658385            0.4951829648
PHY DM    10                    1.531055901            0.4998113071
MFG WT    11                   0.1242236025D-01        0.1573763725
SVP       12                    7.478260870            0.4322217690
ZPHOCC    13                   0.9322981366D-02        0.7539802987D-02
ZWEOCC    14                   0.1189813665            0.1461922292
ZPFOCC    15                   0.3633540373D-02        0.9781213757D-02
DA/PH     16                    47.30596888             103.0200964
AVE IPF   17                   0.5407351967            0.2819909417
FDSL      18                   0.4344804337D-01        0.7050367285D-01
ATREAS    19                   0.4767080745D-01        0.1851246996D-01
ZMININ    20                   0.2835502783            0.1404519636
EDS16     21                    2.599378882             5.642329968
UNXMPE    22                   0.6964068323D-01        0.2153510186
ZEMOCC    23                   0.1226149068            0.1535361206
ZMINOC    24                   0.1319378882            0.1550108102
RAXSEX    25                   0.6211180124D-02        0.7868818624D-01
```

Occupation Stratum 15-17 Cross Race-Sex

CORRELATION MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	0.457204	-0.226632	-0.896311D-01	0.606437D-01	-0.301123	-0.138229D-01	-0.141337
2		1.00000	-0.156598	-0.152818	0.117714D-02	0.826726D-02	-0.531898D-01	-0.293933
3			1.00000	0.103939	-0.928630D-01	0.627862D-01	0.112273	0.105132D-01
4				1.00000	-0.108983	-0.405451D-01	0.347109D-01	0.500279D-01
5					1.00000	-0.101985D-01	-0.588664D-01	-0.206369D-01
6						1.00000	-0.300414D-01	0.813218D-01
7							1.00000	0.126199
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	-0.460926D-01	-0.221985D-01	0.572946D-01	0.329400	-0.963269D-01	-0.197145	-0.563955D-01	0.395570D-01
2	-0.276933D-01	-0.106829	0.459695D-01	0.257020	-0.174933	-0.269176	-0.135370	0.410805D-01
3	0.507702D-02	0.123932	-0.284851D-01	-0.788812D-01	0.126835	0.127220D-01	-0.741977D-02	0.446657D-01
4	-0.402608D-01	0.380729D-01	-0.488604D-01	0.118237D-01	0.533492D-01	0.759574D-02	-0.223169D-01	0.279716D-02
5	-0.437568D-01	0.518006D-01	0.658054D-01	-0.288223D-01	[illegible]	0.202681D-01	0.517571D-02	0.201334
6	-0.200699	-0.739684D-01	-0.580694D-01	-0.256521D-01	-0.475071D-01	0.146419	0.108114D-01	0.195433D-01
7	-0.646879D-02	0.173509D-01	-0.992877D-02	-0.518776D-01	0.346506D-01	0.378742D-01	-0.300331D-02	-0.353054D-01
8	-0.117990	-0.206723D-01	-0.262613D-01	0.230086D-02	0.781107D-02	0.433220	0.233556	-0.774954D-01
9	1.00000	0.534362D-01	-0.680322D-01	-0.100748	0.682127D-01	-0.174692	-0.104064	0.263768D-02
10		1.00000	0.742900D-01	-0.286718	0.454475	-0.581033D-01	0.168015	-0.484332D-01
11			1.00000	0.955789D-01	-0.664014D-01	-0.633589D-01	-0.294139D-01	-0.182410D-01
12				1.00000	-0.399140	-0.189109	-0.206227	0.138569
13					1.00000	0.162232	0.274703	-0.442290D-01
14						1.00000	0.736221	-0.322483D-01
15							1.00000	-0.262634D-01
16								1.00000

Occupation Stratum 15-17 Cross Race-Sex (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.8912600D-01	-0.2077540D-01	0.7333320D-01	0.1344370D-01	0.125845	-0.184959	-0.191308	-0.194173
2	0.157545	0.4273150D-01	0.145623	-0.8348600D-01	0.2609470D-01	-0.133336	-0.264925	-0.270913
3	0.8360090D-01	-0.1549930D-01	0.7064020D-01	-0.2519160D-01	-0.105750	0.898904	0.1164080D-01	0.1769930D-01
4	0.3275430D-01	-0.3062090D-02	-0.8475800D-01	0.2868060D-01	-0.100271	0.9676290D-01	0.5810700D-02	0.8593550D-02
5	0.4127730D-01	-0.2184240D-01	-0.105809	-0.1034130D-01	0.984407	-0.5399790D-01	0.1962830D-01	0.2352830D-01
6	0.3260510D-01	-0.3317240D-01	-0.8217040D-01	0.5066010D-01	-0.3599330D-01	0.5895470D-01	0.140104	0.136460
7	-0.1150630D-01	-0.1824080D-01	0.116658	-0.2573080D-01	-0.5794850D-01	0.122761	0.3587120D-01	0.3721540D-01
8	-0.155171	-0.7196000D-01	0.2602190D-01	0.4300760D-01	-0.3165700D-01	0.3318020D-01	0.427377	0.423691
9	0.116244	0.6073020D-01	0.7900340D-02	-0.121379	-0.4584270D-01	0.1057310D-01	-0.172965	-0.168002
10	0.7154810D-01	0.3717810D-02	-0.6050510D-01	0.112247	0.4695510D-01	0.160413	-0.4462060D-01	-0.2209020D-01
11	-0.2757400D-01	-0.4879480D-01	-0.2682100D-01	-0.9506660D-01	0.7578800D-01	-0.2560540D-01	-0.6220220D-01	-0.6484030D-01
12	0.1554370D-01	0.2099390D-01	-0.5318100D-01	-0.9338980D-01	0.7914380D-02	-0.9321260D-01	-0.193201	-0.210778
13	-0.4117370D-01	-0.5090390D-01	-0.6097640D-01	0.181571	0.8323550D-01	0.8751840D-01	0.171973	0.218977
14	-0.106815	-0.6932230D-01	0.4015450D-01	0.8635340D-01	0.6464180D-02	-0.4957110D-01	0.999070	0.997457
15	0.2255380D-01	-0.4430700D-01	0.9876410D-01	0.7597600D-01	0.5490470D-03	-0.2458400D-01	0.764713	0.770799
16	0.444755	0.6862840D-01	-0.222188	-0.261290	0.200211	0.117367	-0.3237900D-01	-0.3422230D-01
17	1.00000	-0.9356410D-03	0.1232600D-01	-0.202611	0.3795800D-01	0.221755	-0.100269	-0.101316
18		1.00000	-0.117962	-0.234239	-0.2964040D-01	-0.8830910D-02	-0.6882920D-01	-0.7064550D-01
19			1.00000	-0.192116	-0.104993	0.5307570D-01	0.4452570D-01	0.4113620D-01
20				1.00000	-0.1432520D-01	-0.6417480D-01	0.8706310D-01	0.9506660D-01
21					1.00000	-0.7073890D-01	0.6189970D-02	0.1017970D-01
22						1.00000	-0.4876620D-01	-0.4404530D-01
23							1.00000	0.998851
24								1.00000

VARIABLE NUMBER	25
1	-0.3269990D-01
2	-0.7483110D-01
3	0.9544370D-01
4	0.3952750D-01
5	-0.3705540D-01
6	-0.3171250D-01
7	0.439486
8	0.317991
9	0.3198830D-01
10	0.7429000D-01
11	-0.4259900D-02
12	-0.4761470D-01
13	0.7537720D-01
14	-0.1894450D-01
15	-0.1091020D-02
16	-0.2903170D-01
17	-0.4546500D-01
18	-0.2062050D-01
19	0.2386290D-01
20	0.1220630D-01
21	-0.3647760D-01
22	0.7007070D-01
23	-0.1810910D-01
24	-0.1427080D-01
25	1.00000

All Occupation Strata White Males

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VARIABLE                  MEAN                 STANDARD DEVIATION

SCHOOL     1           10.94864865              3.036119469
WAGE       2            3.423854054             1.602651403
UN MEM     3            0.4086486486            0.4917170177
MIG<50     4            0.4081081081            0.4916162340
S.AT16     5            0.2724324324            0.4453315645
EXP        6           27.74378378             12.05366030
TRAIN      7            0.2572972973            0.4372627914
PHY DM     8            2.358108108             0.8488589925
NEG WT     9            0.5454054054            0.9044945001
GED       10            3.551351351             0.9258956492
SVP       11            5.276594595             1.905043908
%BMOCC    12            0.4353521622D-01        0.5297334516D-01
%WFOCC    13            0.1572502703            0.1883648105
%BFOCC    14            0.1124000000D-01        0.2175843381D-01
DA/PW     15           34.93602290             30.35827545
NYL/PW    16            3.975311659             5.540603480
AVEMPF    17            0.4230307027            0.2957854472
EDSL      18            0.3314262196D-01        0.6709415931D-01
EDSLEX    19            0.7221731741D-01        0.8213031622D-01
ATREAS    20            0.4553621622D-01        0.1755434602D-01
MININD    21            0.2832775962            0.1538175286
EDS16     22            2.770459459             4.855956517
UNXMPF    23            0.2008587928            0.3071750921
%FMOCC    24            0.1734902703            0.1996212290
MINOCC    25            0.2270264865            0.1970835872
GD+SV     26            8.827945946             2.735683042
GDXSV     27           20.25604865             11.00030345
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All Occupation Strata White Males

CORRELATION MATRIX

VARIABLE NUMBER	1	2	3	4	5	6	7	8
1	1.00000	0.412329	-0.216874	-0.135599	-0.150448	-0.474197	0.225443	-0.333458
2		1.00000	-0.890077D-01	-0.153548	-0.112289	-0.111559	0.108915	-0.200998
3			1.00000	0.103967	-0.106101	0.846518D-01	-0.893385D-01	0.300232
4				1.00000	-0.634539D-01	0.599122D-01	-0.836777D-01	0.700850D-01
5					1.00000	0.290304D-01	-0.546531D-01	0.850879D-01
6						1.00000	-0.318514	0.104261
7							1.00000	-0.644315D-01
8								1.00000

VARIABLE NUMBER	9	10	11	12	13	14	15	16
1	-0.164571	0.426555	0.302383	-0.391420	0.623116D-01	-0.179302	0.897855D-01	0.110807
2	-0.470392D-01	0.377660	0.316063	-0.285305	-0.670197D-01	-0.167713	0.953957D-01	0.140869
3	0.971567D-01	-0.339284	-0.196823	0.209469	-0.924580D-01	0.556859D-01	0.548017D-01	0.113035
4	0.379017D-02	-0.163516	-0.124079	0.110983	0.507551D-02	0.469604D-01	-0.219716D-01	-0.314665D-01
5	0.914573D-01	-0.571014D-01	-0.204021D-01	0.444467D-01	-0.458285D-01	-0.636069D-02	0.610836D-01	0.516916D-01
6	0.808844D-01	-0.167309	-0.107242	0.139112	-0.320625D-01	0.768180D-01	-0.340666D-01	-0.422709D-01
7	-0.177477D-01	0.216918	0.223500	-0.188755	-0.628863D-01	-0.119388	0.300091D-02	0.235360D-01
8	0.489968	-0.360029	-0.965073D-01	0.452042	-0.497623	-0.121094	0.896227D-02	-0.112063D-01
9	1.00000	-0.145601	0.141373	0.164491	-0.353547	-0.571645D-01	0.479777D-01	0.150775D-01
10		1.00000	0.849248	-0.654721	-0.135900	-0.368329	0.704510D-01	0.705723D-01
11			1.00000	-0.605660	-0.424193	-0.426027	0.778455D-01	0.672030D-01
12				1.00000	-0.203535	0.165911	-0.222112D-01	-0.408195D-01
13					1.00000	0.465301	-0.799074D-01	-0.656047D-01
14						1.00000	-0.562378D-01	-0.576832D-01
15							1.00000	0.865720
16								1.00000

All Occupation Strata White Males (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.137525	0.597681D-02	0.398047D-01	0.679664D-01	-0.117570D-01	0.574968D-01	-0.145066	0.392937D-01
2	0.203553	0.674115D-01	0.134367	0.130171	-0.741078D-01	-0.277735D-01	-0.267301D-01	-0.834919D-01
3	0.178439	0.452108D-01	0.678055D-01	0.183408	-0.121509	-0.122169	0.786810	-0.812343D-01
4	-0.366893D-01	-0.295880D-01	-0.251192D-01	0.712275D-02	-0.845979D-02	-0.902445D-01	0.463600D-01	0.991786D-02
5	-0.298438D-01	-0.121280D-01	-0.257023D-01	-0.836174D-01	0.491517D-02	0.935615	-0.429430D-01	-0.439816D-01
6	-0.597053D-01	-0.118725D-01	-0.289976D-01	-0.471017D-01	0.226194D-01	-0.666649D-01	0.521940D-01	-0.219223D-01
7	0.103946	0.574064D-02	0.210993D-01	-0.177831D-02	-0.756809D-02	-0.107056D-01	-0.293747D-01	-0.724259D-01
8	0.207345D-01	0.217540D-01	0.123974D-01	-0.548290D-01	-0.106144	0.135414D-01	0.283302	-0.463246
9	0.147391D-01	0.267936D-01	0.210607D-01	-0.114399	-0.477303D-01	0.494510D-01	0.956842D-01	-0.340461
10	0.955846D-01	0.262327D-01	0.454933D-01	-0.221914D-01	0.294043D-01	0.384762D-01	-0.229300	-0.166553
11	0.106292	0.831336D-01	0.911369D-01	-0.130243D-01	-0.266679D-01	0.449168D-01	-0.116837	-0.447158
12	-0.973511D-01	-0.680477D-01	-0.964001D-01	-0.336985D-01	-0.485334D-01	-0.365710D-01	0.131628	-0.176689
13	-0.110350	-0.801423D-01	-0.855367D-01	-0.180760D-01	0.190588	-0.203476D-01	-0.119667	0.995326
14	-0.107991	-0.554753D-01	-0.749495D-01	-0.457697D-01	0.226645	-0.335290D-01	-0.660292D-02	0.546611
15	0.455249	0.634910D-01	0.568674D-01	-0.152605	-0.197668	0.887952D-01	0.232426	-0.818314D-01
16	0.582782	0.943052D-01	0.126470	0.205992	-0.229741	0.316177D-01	0.338460	-0.682611D-01
17	1.00000	0.105810	0.138296	0.278992	-0.156088	0.817488D-03	0.535916	-0.116014
18		1.00000	0.932454	-0.505142D-01	-0.215710	-0.142288D-01	0.829354D-01	-0.817660D-01
19			1.00000	0.633927D-01	-0.238449	-0.207779D-01	0.929513D-01	-0.918056D-01
20				1.00000	-0.108229	-0.624881D-01	0.236155	-0.220677D-01
21					1.00000	0.261927D-02	-0.155997	0.204750
22						1.00000	-0.530262D-01	-0.226778D-01
23							1.00000	-0.113753
24								1.00000

VARIABLE NUMBER	25	26	27
1	-0.654494D-01	0.400389	0.438257
2	-0.161149	0.355149	0.391143
3	-0.256951D-01	-0.252017	-0.259179
4	0.398663D-01	-0.143290	-0.149393
5	-0.325544D-01	-0.335543D-01	-0.416930D-01
6	0.152894D-01	-0.131367	-0.143982
7	-0.124029	0.229134	0.226699
8	-0.367474	-0.189189	-0.230977
9	-0.310286	0.420478D-01	0.117202D-01
10	-0.346534	0.429510	0.947327
11	-0.615256	0.923769	0.954786
12	0.920644D-01	-0.543553	-0.614577
13	0.251079	-0.341443	-0.336081
14	0.605997	-0.421453	-0.399673
15	-0.947721D-01	0.743025D-01	0.874136D-01
16	-0.809426D-01	0.707255D-01	0.877597D-01
17	-0.143557	0.107399	0.125215
18	-0.101026	0.701674D-01	0.696493D-01
19	-0.119306	0.745749D-01	0.860931D-01
20	-0.314417D-01	-0.165885D-01	-0.535356D-02
21	0.194129	-0.260802D-02	-0.352060D-02
22	-0.329790D-01	0.443151D-01	0.420713D-01
23	-0.799433D-01	-0.159952	-0.174707
24	0.964369	-0.363495	-0.361020
25	1.00000	-0.545856	-0.530493
26		1.00000	0.985853
27			1.00000

All Occupation Strata Black Males

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	8.512061404	3.414289615
WAGE	2	2.366831140	0.9085147540
UN MEM	3	0.4539473684	0.4981478202
MIG<50	4	0.4265350877	0.4948448302
S.AT16	5	0.7182017544	0.4501223774
EXP	6	29.92872807	12.63184550
TRAIN	7	0.1304824561	0.3370182869
PHY DM	8	2.773026316	0.8169556398
NEG WT	9	0.6918859649	0.9650420761
GED	10	2.763157895	0.7470116868
SVP	11	3.703728070	1.697336754
%BMOCC	12	0.1289243421	0.1310786869
%WFOCC	13	0.1514462719	0.1745036535
%BFOCC	14	0.2219407895D-01	0.4055088073D-01
DA/PW	15	22.68336428	40.60823057
NYL/PW	16	2.870881390	3.370130879
AVEMPF	17	0.3652742325	0.2873401759
FDSL	18	0.4164414372D-01	0.9248027462D-01
FDSLEX	19	0.6609793106D-01	0.1016559490
ATPFAS	20	0.4080043860D-01	0.1888231506D-01
MININD	21	0.3101666323	0.1631280815
EDS16	22	5.646929825	4.563049152
UNXMPF	23	0.2229174342	0.3135152414
%FMOCC	24	0.1736403509	0.1997085858
MINOCC	25	0.3025646930	0.1977858175
GD+SV	26	6.466885965	2.394528147
GDXSV	27	11.38012061	8.195603296

All Occupation Strata Black Males

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CORRELATION MATRIX

VARIABLE       1             2             3             4             5             6             7              8
 NUMBER

    1       1.00000       0.289851      0.630526D-01 -0.113822     -0.303842     -0.579347      0.26621       -0.177485
    2                     1.00000       0.431394     -0.226186     -0.299598     -0.100584      0.19523       -0.826817D-01
    3                                   1.00000      -0.131745     -0.192565      0.881058D-02  0.19486 D-01  0.530582D-02
    4                                                 1.00000      -0.856532D-01 -0.198921D-01 -0.10371        0.632463D-01
    5                                                               1.00000       0.170408     -0.14085        0.130351
    6                                                                             1.00000      -0.25308        0.132682
    7                                                                                           1.0000        -0.557765D-01
    8                                                                                                          1.00000
VARIABLE       9            10            11            12            13            14            15              16
 NUMBER

    1     -0.966493D-01  0.226598      0.192172     -0.225329      0.150876      0.263566D-01 -0.613701 -01  0.563109D-01
    2     -0.180043D-01  0.183558      0.200851     -0.212805      0.281890D-01 -0.124894      0.762397 -01  0.280415
    3      0.241106D-01 -0.157955     -0.966455D-01 -0.414839D-01  0.243490D-01 -0.284933D-01 -0.384756 -01  0.213670
    4      0.111629D-01 -0.536544D-01 -0.565872D-01  0.767029D-01 -0.937065D-01 -0.262300D-01  0.200072 -01 -0.156361D-01
    5      0.222747D-01 -0.138967     -0.126638      0.111489     -0.426555D-01  0.290395D-01  0.592703 -01 -0.670657D-01
    6      0.795990D-01 -0.154812     -0.145132      0.159112     -0.848390D-01  0.252787D-02  0.757619 -01  0.113309D-01
    7     -0.348794D-01  0.128491      0.123879     -0.136442      0.576910D-01 -0.109313D-01 -0.537744 -01  0.324600D-01
    8      0.592040     -0.342338     -0.187319      0.413955     -0.566432     -0.193799      0.875164 -01 -0.161784D-02
    9      1.00000      -0.198181      0.288480D-01  0.110629     -0.244634      0.104169      0.575652 -01 -0.280359D-01
   10                    1.00000       0.904934     -0.501733      0.200548D-01 -0.160899     -0.654781 -01 -0.584852D-01
   11                                  1.00000      -0.483609     -0.114967     -0.144145     -0.593973 -01 -0.542937D-01
   12                                                1.00000      -0.374331     -0.772522D-01 -0.606504 -03 -0.990781D-01
   13                                                              1.00000       0.550263     -0.715793 -01  0.169406D-01
   14                                                                            1.00000      -0.100166      -0.128079
   15                                                                                          1.00000        0.664337
   16                                                                                                         1.00000
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All Occupation Strata Black Males (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.755123D-01	0.383438D-01	0.708562D-01	0.146382	0.639577D-01	0.296828	0.53704 D-01	0.137186
2	0.439700	0.171721	0.230695	0.356466	-0.258019	-0.122432	0.46325	-0.728352D-03
3	0.799369	0.253952D-01	0.848461D-01	0.402510	-0.184284	-0.122577	0.76025	0.154903D-01
4	-0.113301D-01	-0.601250D-01	-0.693281D-01	-0.302354D-01	0.845253D-02	-0.151993	-0.85888 D-01	-0.872060D-01
5	-0.105876	-0.255797D-01	-0.658915D-01	-0.171859	-0.371281D-01	0.775606	-0.15876	-0.313755D-01
6	0.239398D-01	0.688641D-02	-0.172621D-01	-0.797098D-01	-0.495463D-01	-0.182898	0.52825 D-01	-0.736183D-01
7	0.901331D-01	0.714625D-01	0.114417	0.103522	-0.101635D-01	-0.641319D-02	0.59284 D-01	0.481903D-01
8	0.426086D-01	0.755213D-01	0.554191D-01	-0.932185D-01	-0.150560	0.509166D-01	0.55896 D-01	-0.534294
9	0.468268D-01	0.967099D-01	0.344510D-01	-0.717436D-01	-0.108729	-0.115197D-01	0.51880 D-01	-0.192619
10	-0.687994D-01	0.800017D-01	0.923774D-01	-0.529633D-01	0.468023D-01	-0.144795D-01	-0.12624	-0.151470D-01
11	-0.255721D-01	0.145945	0.161354	-0.485112D-01	0.116652D-01	-0.158027D-01	-0.72984 D-01	-0.129726
12	-0.789250D-01	-0.105625	-0.137592	-0.123739	0.390762D-01	-0.196066D-01	-0.57492 D-01	-0.342773
13	-0.368721D-01	-0.830315D-01	-0.776583D-01	0.437729D-01	0.231177	0.401277D-01	-0.62470 D-02	0.985522
14	-0.165394	-0.821673D-01	-0.107541	-0.135009	0.426120	0.576060D-01	-0.96850 D-01	0.683865
15	0.370551	-0.297940D-01	-0.438185D-01	-0.392333D-01	-0.220149	0.213901D-01	0.10002	-0.828841D-01
16	0.681092	0.295258D-01	0.817170D-01	0.540753	-0.320109	-0.392016D-01	0.47072	-0.945612D-02
17	1.00000	0.135232	0.203351	0.548896	-0.321539	-0.579682D-01	0.73844	-0.658018D-01
18		1.00000	0.576992	-0.132368	-0.233201	-0.176154D-01	0.66930 D-01	-0.892363D-01
19			1.00000	-0.268365D-01	-0.253955	-0.403542D-01	0.13365	-0.896933D-01
20				1.00000	-0.259840	-0.824225D-01	0.51801	0.108347D-01
21					1.00000	0.196230D-01	-0.29359	0.286524
22						1.00000	-0.10930	0.467602D-01
23							1.0000	-0.251242D-01
24								1.00000

VARIABLE NUMBER	25	26	27
1	-0.108123D-01	0.206910	0.207059
2	-0.145744	0.199535	0.214889
3	-0.118517D-01	-0.117783	-0.126191
4	-0.372204D-01	-0.639380D-01	-0.614265D-01
5	0.472064D-01	-0.133119	-0.133832
6	0.311144D-01	-0.152419	-0.141553
7	-0.417654D-01	0.128052	0.133292
8	-0.265148	-0.239577	-0.198337
9	-0.121175	-0.413779D-01	0.251678D-02
10	-0.347808	0.953419	0.943787
11	-0.451490	0.991149	0.979151
12	0.316625	-0.499325	-0.460979
13	0.747023	-0.752371D-01	-0.953182D-01
14	0.639316	-0.152371	-0.155226
15	-0.840918D-01	-0.625301D-01	-0.457308D-01
16	-0.752102D-01	-0.567309D-01	-0.467562D-01
17	-0.118748	-0.395896D-01	-0.277206D-01
18	-0.160105	0.128409	0.123992
19	-0.181752	0.143193	0.139971
20	-0.710659D-01	-0.509054D-01	-0.485507D-01
21	0.350363	0.228695D-01	0.190101D-01
22	0.342209D-01	-0.157187D-01	-0.179654D-01
23	-0.634703D-01	-0.911194D-01	-0.907947D-01
24	0.782555	-0.966804D-01	-0.114807
25	1.00000	-0.428538	-0.421428
26		1.00000	0.988491
27			1.00000

All Occupation Strata White Females

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 VARIABLE                    MEAN              STANDARD DEVIATION

SCHOOL     1            10.57403433             2.316032857
WAGE       2            2.051384120            0.9889520294
UN MEM     3           0.2671673820            0.4427180498
MIG<50     4           0.4796137339            0.4998524604
S.AT16     5           0.2832618026            0.4508243841
EXP        6            29.59334764             10.58284685
TRAIN      7           0.1083690987            0.3110128995
PHY DM     8            1.763948498            0.6968308416
NEG WT     9           0.1652360515            0.5228954011
GED       10            3.308369099            0.7754107196
SVP       11            4.160836910             1.388598869
%BMOCC    12           0.2844849785D-01        0.3409789609D-01
%WFCCC    13           0.5480901288            0.2622150920
%BFOCC    14           0.2999356223D-01        0.4428762386D-01
DA/PW     15            15.34410537             35.00407986
NYL/PW    16            2.223251674             3.017452709
AVEMPF    17           0.3508766452            0.2717903175
FDSL      18           0.2486681804D-01        0.3975619450D-01
FDSLEX    19           0.5332428653D-01        0.6034396742D-01
ATPFAS    20           0.4000697425D-01        0.1697163378D-01
MININD    21           0.4715755591            0.1995394110
EDS16     22            2.967811159             4.906322707
UNXMPF    23           0.1069819027            0.2395824421
%FMOCC    24           0.5780836910            0.2682517203
MINOCC    25           0.6065321888            0.2512549256
GD+SV     26            7.469206009             2.089204571
GDXSV     27            14.68225322             7.841667910
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All Occupation Strata White Females

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CORRELATION MATRIX

VARIABLE      1            2            3            4            5            6            7            8
 NUMBER

   1     1.00000      0.182334    -0.190587    -0.209626D-01 -0.262788D-01 -0.416514     0.189412    -0.331916
   2                  1.00000      0.915452D-01 -0.335245D-01 -0.130686    -0.149704     0.112170    -0.207979
   3                               1.00000     -0.408875D-01 -0.142787     0.706596D-01 -0.700825D-0  0.201164
   4                                            1.00000     -0.363114D-01  0.117310D-01 -0.652300D-01 -0.138306D-01
   5                                                         1.00000     -0.489989D-01  0.299192D-02  0.108590D-02
   6                                                                      1.00000     -0.162167     0.161753
   7                                                                                   1.00000     -0.189121
   8                                                                                                1.00000

VARIABLE      9            10           11           12           13           14           15           16
 NUMBER

   1    -0.172421     0.416291     0.309169    -0.283748     0.163575    -0.220983     0.116575     0.904875D-01
   2    -0.121725     0.136082     0.123768    -0.127055     0.124374    -0.147388     0.174371     0.279324
   3     0.132526D-01 -0.299072    -0.254479     0.144464    -0.625889D-01  0.633300D-02  0.395138D- 1  0.809213D-01
   4     0.211209D-01 -0.774316D-01 -0.539987D-01  0.186239D-01  0.366704D-01  0.596259D-01  0.351092D- 1  0.532971D-01
   5     0.472856D-01 -0.574673D-01 -0.867524D-01  0.633475D-01 -0.277476D-01  0.654711D-02  0.502556D- 1 -0.442682D-02
   6     0.742687D-01 -0.104430    -0.938196D-01  0.766920D-01 -0.791663D-01  0.976638D-01 -0.690872D- 1 -0.693152D-01
   7    -0.507830D-01  0.164147     0.139167    -0.130789     0.120380    -0.741693D-01  0.940518D- 1  0.749606D-01
   8     0.502175    -0.533665    -0.316718     0.584633    -0.455619     0.203594    -0.198904    -0.127754
   9     1.00000     -0.232299     0.266736D-01  0.457181    -0.269650     0.437154    -0.681429D- 1 -0.821462D-01
  10                  1.00000      0.852256    -0.630927     0.194563    -0.347398     0.658036D- 1 -0.233996D-01
  11                               1.00000     -0.475060     0.873777D-01 -0.255382     0.675122D- 3 -0.476811D-01
  12                                            1.00000     -0.602695     0.259836    -0.795731D- 1  0.110672D-02
  13                                                         1.00000      0.534253D-01  0.106733     0.220021D-01
  14                                                                      1.00000     -0.695671D- 1 -0.119156
  15                                                                                   1.00000      0.763602
  16                                                                                                1.00000
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All Occupation Strata White Females (cont.)

VARIABLE NUMBER	17	18	19	20	21	22	23	24
1	0.136223	0.255629D-01	-0.220530D-02	0.415953D-01	-0.189897	0.129710	-0.300633D-02	0.123411
2	0.256673	0.123638	0.129167	0.161011	-0.235520	-0.971679D-01	0.170212	0.972420D-01
3	0.110145	0.817786D-01	0.104545	0.156273	0.995988D-02	-0.131035	0.739944	-0.601349D-01
4	0.334469D-02	-0.459994D-01	-0.521910D-01	0.221301D-01	0.186799D-01	-0.471315D-01	-0.789179D-02	0.456893D-01
5	0.169713D-01	-0.546257D-01	-0.947477D-01	-0.853175D-01	0.362221D-01	0.962719	-0.280457D-01	-0.260422D-01
6	-0.104221	-0.399865D-01	-0.563156D-01	-0.620455D-01	0.134030	-0.117215	-0.158834D-01	-0.612608D-01
7	0.835410D-01	0.197408D-01	0.227399D-02	-0.240334D-01	-0.115736	0.332604D-01	0.987834D-01	0.105436
8	-0.122664	0.985541D-01	0.212742	0.657686D-01	0.109729	-0.494380D-01	0.758974D-01	-0.411753
9	-0.115540	0.511169D-02	0.171285D-01	-0.492340D-01	0.732458D-01	0.416880D-02	-0.122737D-01	-0.191409
10	0.662269D-01	-0.104095	-0.217312	-0.116991	-0.400718D-01	-0.608459D-02	-0.168021	0.132831
11	-0.330548D-01	-0.419453D-01	-0.127123	-0.105220	-0.325820D-01	-0.425323D-01	-0.170647	0.432486D-01
12	-0.573533D-01	0.538236D-01	0.150689	0.118263	-0.225210D-01	0.596111D-02	0.759207D-01	-0.546234
13	-0.493968D-01	-0.361956D-01	-0.147531	-0.202816	0.342222D-01	0.332351D-02	-0.850063D-01	0.986317
14	-0.204547	0.848691D-02	-0.530074D-01	-0.179303	0.172097	-0.346284D-01	-0.654892D-01	0.217320
15	0.519723	0.666919D-02	-0.237595D-01	0.741586D-01	-0.242261	0.665299D-01	0.226240	0.928504D-01
16	0.614972	0.718931D-01	0.148962	0.488251	-0.393494	-0.124649D-02	0.312075	0.183454D-02
17	1.00000	0.200567D-01	0.133111	0.359369	-0.244607	0.472341D-01	0.480363	-0.825607D-01
18		1.00000	0.849453	0.122752	-0.206804	-0.466038D-01	0.613428D-01	-0.339799D-01
19			1.00000	0.354038	-0.305435	-0.866000D-01	0.124084	-0.152963
20				1.00000	-0.443967	-0.809490D-01	0.282425	-0.227854
21					1.00000	0.158614D-01	-0.178831	0.618649D-01
22						1.00000	-0.126970D-01	-0.246833D-02
23							1.00000	-0.939055D-01
24								1.00000

VARIABLE NUMBER	25	26	27
1	0.932517D-01	0.360011	0.364038
2	0.865775D-01	0.132770	0.142649
3	-0.445975D-01	-0.280142	-0.278877
4	0.513075D-01	-0.646293D-01	-0.670684D-01
5	-0.192070D-01	-0.789968D-01	-0.784359D-01
6	-0.549970D-01	-0.100984	-0.101416
7	0.943192D-01	0.153422	0.154605
8	-0.360266	-0.408578	-0.380963
9	-0.142313	-0.684855D-01	-0.529115D-01
10	0.561930D-01	0.937607	0.925838
11	-0.182963D-01	0.980970	0.972811
12	-0.447475	-0.549920	-0.509770
13	0.971247	0.133268	0.891052D-01
14	0.267264	-0.298673	-0.280976
15	0.883326D-01	0.248718D-01	0.224231D-01
16	0.210684D-02	-0.405618D-01	-0.299143D-01
17	-0.960106D-01	0.261021D-02	0.236566D-02
18	-0.289742D-01	-0.668452D-01	-0.612135D-01
19	-0.142860	-0.165149	-0.153464
20	-0.227216	-0.113356	-0.916991D-01
21	0.629935D-01	-0.365265D-01	-0.613520D-01
22	-0.182632D-02	-0.260110D-01	-0.288846D-01
23	-0.299547D-01	-0.175783	-0.171870
24	0.993518	0.780456D-01	0.407117D-01
25	1.00000	0.869541D-02	-0.257153D-01
26		1.00000	0.990209
27			1.00000

All Occupation Strata Black Females

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	9.670025189	2.924890268
WAGE	2	1.662972292	0.6658260572
UN MEM	3	0.3224181360	0.4679918376
MIG<50	4	0.4256926952	0.4950715041
S.AT16	5	0.6725440806	0.4698772956
EXP	6	27.93198992	11.76958541
TRAIN	7	0.1360201511	0.3432425293
PHY DM	8	2.156171285	0.6161032245
NEG WT	9	0.7027707809	0.3860976645
GED	10	2.728211587	0.7153512068
SVP	11	3.470277078	1.324601398
%BMOCC	12	0.5238664987D-01	0.4175493376D-01
%WFOCC	13	0.4609294710	0.2116161955
%BFOCC	14	0.1270226700	0.1670701540
DA/PW	15	9.738452352	23.55679229
NYL/PW	16	1.261758694	2.447674676
AVEMPF	17	0.2392420655	0.2479283582
FDSL	18	0.2576245756D-01	0.4467598325D-01
FDSLEX	19	0.4625979412D-01	0.5598939002D-01
ATPFAS	20	0.3273753149D-01	0.1688494569D-01
MININD	21	0.5444036008	0.1727509116
EDS16	22	6.272040302	5.028359882
UNXMPF	23	0.9613954660D-01	0.2157212631
%FMOCC	24	0.5879521411	0.2572498888
MINOCC	25	0.6408387909	0.2428419056
GD+SV	26	6.198488665	1.771693046
GDXSV	27	10.27624685	6.597828941

All Occupation Strata Black Female

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CORRELATION MATRIX

VARIABLE      1            2            3              4             5            6              7              8
 NUMBER

   1       1.00000      0.430018     0.502473D-01  -0.132947     -0.168854    -0.561318      0.248561     -0.184332
   2                    1.00000      0.306574      -0.128183     -0.264777    -0.225540      0.210597     -0.202491
   3                                 1.00000       -0.147017     -0.161755     0.186519D-01  0.564274D-01 -0.699765D-01
   4                                                1.00000      -0.245937     0.405189D-01 -0.592552D-01 -0.363694D-01
   5                                                              1.00000      0.895709D-01 -0.832563D-01  0.124756
   6                                                                           1.00000      -0.260867      0.133658
   7                                                                                         1.00000      -0.172350
   8                                                                                                       1.00000

VARIABLE      9            10           11             12            13             14             15             16
 NUMBER

   1      -0.309937     0.263343     0.135382      -0.184684      0.540328D-01 -0.366839      0.547592D-01  0.132190
   2      -0.335091     0.203467     0.101250      -0.179265     -0.508088D-01 -0.385973      0.212467      0.315445
   3      -0.182410    -0.145665    -0.129116      -0.290107D-01 -0.766738D-01 -0.754436D-01  0.257827D-01  0.989977D-01
   4      -0.504741D-01 0.622649D-01 0.262747D-01  -0.212368D-01  0.526652D-01 -0.266788D-01  0.846105D-01  0.952013D-01
   5       0.117422    -0.127210    -0.842453D-01   0.589833D-01 -0.250797D-01  0.169551     -0.155699     -0.209363
   6       0.190072    -0.150068    -0.663555D-01   0.177052     -0.112706      0.202997     -0.730480D-01 -0.105566
   7      -0.165637     0.139629     0.494600D-01  -0.136002      0.120562     -0.163423      0.156640      0.184978
   8       0.473790    -0.209414     0.985313D-01   0.512601     -0.268946      0.475593D-01 -0.110080     -0.109726
   9       1.00000     -0.219794     0.109710       0.457809     -0.186389      0.466424     -0.119980     -0.263205
  10                    1.00000      0.855505      -0.402715      0.160820     -0.483695      0.121342      0.132107
  11                                 1.00000       -0.194201     -0.110388D-02 -0.398475      0.203637D-01  0.204819D-01
  12                                                1.00000      -0.475801     -0.387334D-01 -0.112528     -0.814087D-01
  13                                                              1.00000      -0.921566D-01  0.473632D-01 -0.135093D-02
  14                                                                            1.00000      -0.477170D-01 -0.242767
  15                                                                                          1.00000       0.827281
  16                                                                                                        1.00000
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All Occupation Strata Black Females (cont.)

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VARIABLE      17               18               19               20               21               22               23               24
 NUMBER

    1     0.244642       0.653911D-01     0.160246         0.292002        -0.182238         0.266415         0.159737        -0.193794
    2     0.389711       0.179612         0.265116         0.400431        -0.411135        -0.795291D-01     0.358065        -0.292465
    3     0.164197       0.616197D-01     0.109283         0.211586        -0.134417        -0.103399         0.646886        -0.112069
    4     0.393112D-01  -0.392469D-01    -0.416210D-01     0.346066D-01    -0.850092D-02    -0.321540        -0.652731D-01     0.259964D-01
    5    -0.190637      -0.137613D-01    -0.995156D-01    -0.211382         0.751416D-01     0.871458        -0.160521         0.395981D-01
    6    -0.164353      -0.164797D-01    -0.115509        -0.152996         0.995426D-01    -0.155089        -0.671263D-01     0.391230D-01
    7     0.210039       0.741297D-01     0.131379         0.116412        -0.119135         0.180106D-01     0.157876        -0.721883D-02
    8    -0.184707      -0.873374D-01    -0.324249D-01    -0.746687D-01    -0.720784D-01     0.449904D-01    -0.122997        -0.193350
    9    -0.343548      -0.121582        -0.249637        -0.304695         0.234920        -0.129783D-01    -0.236104         0.149592
   10     0.202111      -0.128446D-01     0.337069D-01     0.145291        -0.416587D-01    -0.243935D-01    -0.626598D-02    -0.181972
   11     0.144360D-01  -0.445294D-01     0.151035D-02     0.669106D-01     0.455937D-02    -0.327155D-01    -0.805034D-01    -0.259697
   12    -0.146239      -0.641035D-01    -0.435802D-01     0.118151        -0.593949D-01    -0.151335D-01    -0.665167D-01    -0.416554
   13    -0.578226D-01   0.328323D-01    -0.766006D-01    -0.173752         0.222347        -0.123794D-01    -0.244313D-01     0.762759
   14    -0.253540      -0.438290D-01    -0.213692        -0.583329         0.232319         0.227457D-01    -0.184858         0.573628
   15     0.433056       0.309263D-01     0.549671D-01     0.687731D-01    -0.230668        -0.135249         0.181496         0.797176D-02
   16     0.626959       0.446660D-01     0.196800         0.471178        -0.397458        -0.154598         0.333796        -0.158775
   17     1.00000        0.434246D-01     0.257440         0.500340        -0.418622        -0.138778         0.612210        -0.216149
   18                    1.00000          0.355130         0.247604D-01    -0.215721         0.412293D-01     0.280658D-01    -0.145593D-02
   19                                     1.00000          0.304675        -0.395782        -0.908775D-02     0.166500        -0.202008
   20                                                      1.00000         -0.510013        -0.846513D-01     0.362622        -0.521772
   21                                                                       1.00000          0.472429D-02    -0.281614         0.333784
   22                                                                                        1.00000         -0.988109D-01     0.462113D-02
   23                                                                                                         1.00000         -0.140153
   24                                                                                                                          1.00000

VARIABLE      25               26               27
 NUMBER

    1    -0.237049       0.186494         0.170492
    2    -0.340640       0.141848         0.124600
    3    -0.123707      -0.139590        -0.153213
    4     0.238373D-01   0.402423D-01     0.436389D-01
    5     0.105056      -0.102750        -0.963436D-01
    6     0.715870D-01  -0.100368        -0.896486D-01
    7    -0.313317D-01   0.838865D-01     0.746905D-01
    8    -0.113505      -0.973336D-02     0.699042D-02
    9     0.237165      -0.603931D-02     0.410200D-01
   10    -0.252113       0.937547         0.928563
   11    -0.306436       0.982196         0.977240
   12    -0.269326      -0.276575        -0.272384
   13     0.726203       0.576056D-01     0.201506D-01
   14     0.601012      -0.443262        -0.384660
   15    -0.109037D-01   0.577046D-01     0.616417D-01
   16    -0.182193       0.616837D-01     0.523184D-01
   17    -0.254126       0.830489D-01     0.764922D-01
   18    -0.125445D-01  -0.345768D-01    -0.419405D-01
   19    -0.221436       0.132439D-01    -0.332340D-02
   20    -0.532414       0.975972D-01     0.711900D-01
   21     0.350252      -0.120512D-01    -0.326071D-02
   22     0.229842D-02  -0.335288D-01    -0.304179D-01
   23    -0.159305      -0.563563D-01    -0.740427D-01
   24     0.987707      -0.240488        -0.233240
   25     1.00000       -0.302312        -0.293913
   26                    1.00000          0.993418
   27                                     1.00000
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All Occupation Strata Cross Race-Sex

VARIABLE		MEAN	STANDARD DEVIATION
SCHOOL	1	10.77109440	2.910028464
WAGE	2	2.958421053	1.517826903
UNION	3	0.3642439432	0.4813180476
MIG<50	4	0.4298245614	0.4951543409
S 16	5	0.2861319967	0.4520462749
EXP	6	28.37176274	11.62024710
RACE	7	0.8604845447D-01	0.2804941750
SEX	8	0.2878028404	0.4528333252
TRAIN	9	0.2017543860	0.4013936397
PHY DM	10	2.210944027	0.8625740317
NEG WT	11	0.4482038429	0.8344037001
SVP	12	4.853968254	1.878014896
%BMOCC	13	0.4767126149D-01	0.5756481215D-01
%WFOCC	14	0.2745614035	0.2727570487
%BFOCC	15	0.1902965748D-01	0.4124376838D-01
DA/PW	16	27.63948124	65.63100786
AVEMPF	17	0.3995127541	0.2919289129
FDSL	18	0.3538361421D-01	0.6429166881D-01
ATPPAS	19	0.4308847118D-01	0.1758789617D-01
%MININ	20	0.3423889435	0.1894500734
EDS16	21	2.837510443	4.806049936
UNXMPF	22	0.1734650654	0.2933291042
%FMOCC	23	0.2935910610	0.2873789668
%MINOC	24	0.3412623225	0.2748465174
RAXSEX	25	0.2548036759D-01	0.1576118492

All Occupation Strata Cross Race-Sex

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CORRELATION MATRIX

VARIABLE        1             2             3             4             5             6             7             8
 NUMBER

    1      1.00000       0.380866     -0.192853     -0.871366D-01 -0.185901     -0.457394     -0.158629     -0.492435D-01
    2                    1.00000       0.170212D-01 -0.153866     -0.153753     -0.130461     -0.168576     -0.404412
    3                                  1.00000       0.599545D-01 -0.120053      0.812771D-01  0.215610D-01 -0.143728
    4                                                1.00000      -0.661459D-01  0.407046D-01 -0.163636D-02  0.724063D-01
    5                                                              1.00000       0.297307D-01  0.221001      0.364500D-01
    6                                                                            1.00000       0.309865D-03  0.696356D-01
    7                                                                                          1.00000 .     0.563449D-02
    8                                                                                                        1.00000
VARIABLE        9             10            11            12            13            14            15            16
 NUMBER

    1      0.234175     -0.329333     -0.184639      0.344472     -0.371401      0.467139D-01 -0.176372      0.715492D-01
    2      0.190505     -0.732055D-01  0.108240D-01  0.379039     -0.193774     -0.251922     -0.233203      0.155126
    3     -0.560860D-01  0.246820      0.896574D-01 -0.156517      0.190892     -0.155247     -0.216791D-01  0.664520D-01
    4     -0.116933      0.312433D-01 -0.910703D-02 -0.796456D-01  0.569468D-01  0.433554D-01  0.280233D-01 -0.952397D-02
    5     -0.672532D-01  0.648421D-01  0.753150D-01 -0.105520      0.119181     -0.513317D-02  0.605551D-01  0.235163D-01
    6     -0.301977      0.115579      0.857279D-01 -0.957181D-01  0.130163     -0.215796D-01  0.751612D-01 -0.331001D-01
    7     -0.540463D-01  0.151207      0.922562D-01 -0.214124      0.301917     -0.381616D-01  0.173202     -0.457742D-01
    8     -0.144860     -0.330948     -0.186701     -0.251676     -0.169916      0.639509      0.280526     -0.139483
    9      1.00000      -0.396918D-01 -0.168221D-01  0.232847     -0.132966     -0.921826D-01 -0.102366      0.647355D-01
   10                    1.00000       0.526995     -0.914627D-01  0.534481     -0.552400     -0.531989D-01  0.184769D-01
   11                                  1.00000       0.113308      0.281576     -0.353346      0.671640D-01  0.594772D-01
   12                                                1.00000      -0.517724     -0.338603     -0.331953      0.739628D-01
   13                                                              1.00000      -0.342583      0.838296D-01 -0.344079D-02
   14                                                                            1.00000       0.288422     -0.903832D-01
   15                                                                                          1.00000      -0.775553D-01
   16                                                                                                        1.00000
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All Occupation Strata Cross Race-Sex (cont.)

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VARIABLE     17            18             19             20             21             22             23             24
 NUMBER

    1    0.155033      0.331983D-01   0.832358D-01  -0.812548D-01   0.412621D-01  -0.135624       0.190330D-01  -0.578694D-01
    2    0.263493      0.114617       0.204637      -0.291766      -0.750065D-01   0.767427D-01  -0.272572      -0.125586
    3    0.176965      0.583055D-01   0.228716      -0.152415      -0.128459       0.751442      -0.150460      -0.117329
    4   -0.317574D-01 -0.376854D-01  -0.951713D-02   0.454836D-01  -0.782829D-01   0.270216D-01   0.451608D-01   0.591683D-01
    5   -0.533341D-01 -0.246864D-01  -0.103629       0.600203D-01   0.932751      -0.611297D-01   0.381570D-02   0.287450D-01
    6   -0.666645D-01 -0.183817D-01  -0.653971D-01   0.640371D-01  -0.710423D-01   0.340235D-01  -0.100743D-01   0.104448D-01
    7   -0.803713D-01  0.137468D-03  -0.606015D-01   0.340968D-01   0.141191      -0.701079D-04  -0.113624D-01   0.513541D-01
    8   -0.119119     -0.123403      -0.159965       0.469665       0.466536D-01  -0.151364       0.647231       0.637155
    9    0.124450      0.949127D-03   0.230599D-01  -0.418521D-01  -0.217741D-01   0.190051D-02  -0.102183      -0.134692
   10   -0.215153D-02  0.415939D-01   0.310707D-02  -0.169654      -[illegible]   0.256363      -0.532403      -0.444736
   11    0.101649D-02  0.250193D-01  -0.701457D-01  -0.113367       0.219149D-01   0.815399D-01  -0.122573      -0.278304
   12    0.135202      0.792009D-01   0.390774D-01  -0.134194      -0.333030D-01  -0.816440D-01  -0.369016      -0.494276
   13   -0.818430D-01 -0.348449D-01  -0.105215D-01  -0.112399       0.100871D-01   0.128107      -0.313118      -0.117952
   14   -0.122898     -0.102479      -0.159121       0.371248       0.272017D-01  -0.168150       0.990513       0.963928
   15   -0.174893     -0.518518D-01  -0.173364       0.291648       0.236129D-01  -0.755856D-01   0.417264       0.453848
   16    0.453122      0.533099D-01  -0.871836D-01  -0.226539       0.425303D-01   0.234108      -0.969149D-01  -0.102055
   17    1.00000       0.597235D-01   0.331952      -0.239729      -0.163218D-01   0.546695      -0.141745      -0.165351
   18                  1.00000       -0.917460D-02  -0.228235      -0.179083D-01   0.891890D-01  -0.105181      -0.117276
   19                                 1.00000       -0.282844      -0.784496D-01   0.296736      -0.175909      -0.186205
   20                                                1.00000        0.574524D-01  -0.222590       0.394216       0.388650
   21                                                               1.00000       -0.659957D-01   0.292066D-01   0.326510D-01
   22                                                                              1.00000       -0.170413      -0.151352
   23                                                                                             1.00000        0.980017
   24                                                                                                            1.00000

VARIABLE     25
 NUMBER

    1   -0.583445D-01
    2   -0.135499
    3   -0.342569D-01
    4    0.418035D-02
    5    0.794502D-01
    6    0.486509D-02
    7    0.525794
    8    0.254367
    9   -0.215441D-01
   10   -0.256676D-02
   11    0.402264D-01
   12   -0.120414
   13    0.346649D-01
   14    0.103479
   15    0.321116
   16   -0.457542D-01
   17   -0.784540D-01
   18   -0.301473D-01
   19   -0.786601D-01
   20    0.157671
   21    0.567735D-01
   22   -0.581325D-01
   23    0.144774
   24    0.153678
   25    1.00000
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